

APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

REPORT

OF THE

DOMINION EXPERIMENTAL FARMS

FOR THE

FISCAL YEAR ENDING MARCH 31, 1918

PRINTED BY ORDER OF PARLIAMENT



OTTAWA
J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1918

DOMINION EXPERIMENTAL FARMS.

J. H. GRISDALE, B. Agr., Director.

PERSONNEL.

Central Experimental Farm, Ottawa, Ont.—

Dominion Chemist... .. F. T. Shutt, M.A., D.Sc.
 Assistant Dominion Field Husbandman... .. W. L. Graham, B.S.A.
 Dominion Animal Husbandman... .. E. S. Archibald, B.A., B.S.A.
 Dominion Horticulturist... .. W. T. Macoun.
 Dominion Cerealist... .. C. E. Saunders, Ph.D.
 Dominion Botanist... .. J. H. Grisdale, B.Agr. (Acting).
 Apiarist... .. F. W. L. Sladen.
 Dominion Agrostologist... .. M. O. Malte, Ph.D.
 Dominion Poultry Husbandman... .. F. C. Elford.
 Chief Officer, Tobacco Division... .. F. Charlan.
 Chief Officer, Division of Economic Fibre Production... R. J. Hutchinson.
 Supervisor, Division of Illustration Stations... .. J. Fixter.
 Officer in Charge, Division of Extension and Publicity... W. A. Lang.

Branch Farms and Stations—

Superintendent, Experimental Station, Charlottetown,
 P.E.I... .. J. A. Clark, B.S.A.
 Superintendent, Experimental Station, Kentville, N.S. ... W. S. Blair.
 Superintendent, Experimental Farm, Nappan, N.S. ... W. W. Baird, B.S.A.
 Superintendent, Experimental Station, Fredericton, N.B. W. W. Hubbard.
 Superintendent, Experimental Station, Ste. Anne de la
 Pocatière, Que... .. J. Begin.
 Superintendent, Experimental Station, Cap Rouge, Que. G. A. Langelier.
 Superintendent, Experimental Station, Lennoxville, Que. J. A. McClary.
 Foreman-Manager, Experimental Station, Spirit Lake,
 Que... .. P. Fortier.
 Foreman-Manager, Experimental Station, Kapuskasing,
 Ont... .. S. Ballantyne.
 Acting Superintendent, Experimental Station, Morden,
 Man... .. E. M. Straight.
 Superintendent, Experimental Farm, Brandon, Man... .. W. C. McKillican, B.S.A.
 Superintendent, Experimental Farm, Indian Head, Sask. W. H. Gibson, B.S.A.
 Superintendent, Experimental Station, Rosthern, Sask. ... W. A. Munro, B.A., B.S.A.
 Acting Superintendent, Experimental Station, Scott,
 Sask... .. M. J. Tinline, B.S.A.
 Superintendent, Experimental Station, Lethbridge, Alta. W. H. Fairfield, M.S.
 Superintendent, Experimental Station, Lacombe, Alta.. G. H. Hutton, B.S.A.
 Superintendent, Experimental Station, Summerland, B.C. R. H. Helmer.
 Superintendent, Experimental Station, Invermere, B.C.. G. E. Parham.
 Officer in Charge, Experimental Farm, Agassiz, B.C. ... W. H. Hicks, B.S.A.
 Superintendent, Experimental Station, Sidney, B.C. ... L. Stevenson, B.S.A., M.S.

OTTAWA, March 31, 1918.

SIR,—I have the honour to submit herewith, for your approval, the thirty-first annual report of the work carried on at the Dominion Experimental Farms, Stations, and Substations.

Following out the plan incepted last year, this report gives merely a brief review of the year's progress in the various lines of work under way. The complementary part of the plan, namely, the publication of our detailed results when a certain line of experiment is complete, has already been put into action by the issuing of a number of useful publications during the past year, and it is hoped to add to these during the coming twelvemonth.

I have the honour to be, sir,

Your obedient servant,

J. H. GRISDALE,

Director, Dominion Experimental Farms.

To the Honourable

The Minister of Agriculture,

Ottawa.

TABLE OF CONTENTS

	PAGES.
Director's Report—J. H. Grisdale, B.Agr.,—including general notes and synopsis of the work on the Sub-Stations..	5- 15
Chemist—Report of the Dominion..	16- 24
Field Husbandman—Report of the Assistant Dominion..	25- 27
Animal Husbandman—Report of the Dominion..	27- 31
Horticulturist—Report of the Dominion..	32- 35
Cerealist—Report of the Dominion..	35- 37
Botanist—Report of the Dominion..	38- 41
Apiarist—Report of the..	41- 43
Agrostologist—Report of the Dominion..	43- 45
Poultry Husbandman—Report of the Dominion..	45- 47
Tobacco Husbandman—Report of the..	48- 50
Economic Fibre Specialist—Report of the..	51
Supervisor, Illustration Stations—Report of the..	51- 60
Extension and Publicity—Report of the Officer in Charge..	60
Charlottetown, P.E.I.—Report of the Superintendent at..	61- 65
Kentville, N.S.—Report of the Superintendent at..	65- 71
Nappan, N.S.—Report of the Superintendent at..	71- 77
Fredericton, N.B.—Report of the Superintendent at..	78- 83
Ste. Anne de la Pocatière, Que.—Report of the Superintendent at..	83- 87
Cap Rouge, Que.—Report of the Superintendent at..	87- 98
Lennoxville, Que.—Report of the Superintendent at..	99-104
Spirit Lake, Que.—Report of the Foreman-Manager at..	104-106
Kapuskasing, Ont.—Report of the Foreman-Manager at..	106-108
Morden, Man.—Report of the Acting Superintendent at..	108-110
Brandon, Man.—Report of the Superintendent at..	110-114
Indian Head, Sask.—Report of the Superintendent at..	115-118
Rosthern, Sask.—Report of the Superintendent at..	118-120
Scott, Sask.—Report of the Acting Superintendent at..	120-123
Lethbridge, Alta.—Report of the Superintendent at..	124-128
Lacombe, Alta.—Report of the Superintendent at..	128-131
Summerland, B.C.—Report of the Superintendent at..	132-134
Invermere, B.C.—Report of the Superintendent at..	135-140
Agassiz, B.C.—Report of the Officer in Charge at..	140-145
Sidley, B.C.—Report of the Superintendent at..	145-148

ANNUAL REPORT OF THE EXPERIMENTAL FARMS

FOR THE YEAR ENDING MARCH 31, 1918

REPORT OF THE DIRECTOR

J. H. GRISDALE, B. Agr.

FIELD CROP AND LIVE-STOCK NOTES FOR 1917.

The spring of 1917 was backward, and consequently seeding, practically all over the Dominion, was delayed to such an extent that the grain acreage was much less than usual, and a correspondingly larger acreage was devoted to later-sown crops.

Severe frosts in May and continued dry weather until just before harvest caused the grain yield in the Prairie Provinces to be lower than usual, but the diminution in yield was offset by increased prices, while the crop in general graded high.

The season in the Maritime Provinces and Quebec was a poor one, but in Ontario general conditions were excellent, and the season was one of the best on record.

The total value of Canada's field crops for the year was \$1,144,636,456, this being the first time in Canada's history that the value of her field crops has exceeded a billion dollars. This is an increase of more than a quarter of a million dollars over the figures for 1916.

The area under root and fodder crops was greater than in 1916. Although the yield of potatoes per acre was the lowest on record, a greatly increased acreage, together with higher prices, caused the total value of this crop to be nearly \$30,000,000 greater than the previous year.

In the following tables details are given of the yields and values of the principal field crops for 1916 and 1917.

In table 3 the numbers of the various classes of live stock in Canada are given for the period of 1913-17.

COMPARISON of Yields and Prices obtained for the Years 1916 and 1917.

Crop.	Average Yield per Acre.		Average Price per Bushel.		Total Production.	
	1916	1917	1916	1917	1916	1917
	bush.	bush.	\$	\$	bush.	bush.
Fall wheat.....	21.50	21.50	1 54	2 08	17,590,000	15,533,450
Spring wheat.....	16.85	15.50	1 29	1 93	245,191,000	218,209 400
All wheat.....	17.10	15.75	1 31	1 94	262,781,000	233,742,850
Oats.....	37.30	30.25	0 51	0 69	410,211,000	403,009,800
Barley.....	23.72	23.00	0 82	1 08	42,770,000	55,057,750
Rye.....	19.38	18.25	1 11	1 62	2,876,400	3,857,200
Peas.....	14.50	15.25	2 22	3 54	2,218,100	3,026,340
Beans.....	12.70	13.75	5 40	7 45	412,600	1,274,000
Buckwheat.....	17.50	18.00	1 07	1 46	5,976,000	7,149,400
Mixed grains.....	25.75	32.50	0 88	1 16	10,584,800	16,157,080
Flax.....	12.56	6.50	2 04	2 65	8,259,800	5,934,900
Corn for husking.....	36.25	33.00	1.07	1 84	6,282,000	7,762,700
Potatoes.....	133.82	121.50	0 81	1 01	63,297,000	79,892,000
Turnips, Mangels, etc.....	264.24	290.75	0 39	0 46	36,921,100	63,451,000
	tons	tons	per ton	per ton	tons	tons
Hay and Clover.....	1.86	1.66	11 60	10 33	14,527,000	13,684,700
Fodder corn.....	6.65	7.34	4 92	5 14	1,907,800	2,690,370
Sugar beets,....	4.75	8.40	6 20	6 75	71,000	117,600
Alfalfa.....	2.91	2.39	10 69	11 59	286,750	262,400

TABLE 2.—Comparison of Eastern Canada, Prairie Provinces, and British Columbia as to Yields and Prices obtained.

	Eastern Provinces.				Prairie Provinces				British Columbia			
	Average Yield per acre		Average Price Obtained		Average Yield per acre		Average Price Obtained		Average Yield per acre		Average Price Obtained	
	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917	1916	1917
			\$	\$			\$	\$			\$	\$
Fall wheat.....	21.25	21.50	1 55	2 09	25.06	20.07	1 40	2 00	30.75	31.75	1 53	1 92
Spring wheat.....	16.23	18.93	1 71	2 17	16.85	15.54	1 29	1 91	31.00	28.50	1 54	2 00
Oats.....	25.90	30.87	0 68	0 78	42.65	29.78	0 46	0 63	60.50	53.75	0 64	0 90
Barley.....	22.56	27.04	1 01	1 25	24.02	21.83	0 77	1 02	45.75	29.25	0 83	1 28
Peas.....	14.23	15.11	2 23	3 56	28.88	17.34	2 25	3 16	33.75	23.75	1 67	2 46
Rye.....	17.15	17.49	1 19	1 68	21.83	18.74	1 04	1 59				
Flax.....	9.46	10.21	2 75	3 54	12.58	6.41	2 04	2 63				
Potatoes.....	124.73	116.70	0 90	1 09	155.38	132.86	0 53	0 80	189.00	166.55	0 70	0 69
Turnips, etc.....	256.14	303.50	0 37	0 43	207.70	181.70	0 56	0 80	500.00	344.58	0 50	0 64
	tons	tons			tons	tons			tons	tons		
Hay and clover.....	1.83	1.69	11 56	10 15	1.94	1.42	8 10	10 68	2.67	1.85	17.75	17 60
Sugar beets.....	4.75	8.40	6 20	6 75								
Fodder corn.....	6.67	7.74	4 91	5 00	2.71	2.82	5 14	7 66	10.00	7.00	7 00	15 00
Alfalfa.....	2.99	2.77	9 75	9 98	2.69	1.96	10.83	11.47	2.88	2.58	15.00	22 92

TABLE 3.—Farm Live Stock, 1913-17.

	1913	1914	1915	1916	1917
Eastern Provinces:—					
Horses.....	1,436,207	1,441,381	1,442,063	1,396,760	1,434,832
Milch cows.....	2,188,824	2,097,586	2,075,750	1,998,318	2,270,837
Other cattle.....	2,479,406	1,904,976	1,848,504	1,727,773	2,103,329
Sheep.....	1,747,108	1,630,714	1,569,488	1,483,065	1,840,054
Swine.....	2,491,564	2,357,128	2,269,029	2,096,832	2,102,506
Western Provinces:—					
Horses.....	1,369,283	1,445,652	1,492,681	1,800,270	1,922,793
Milch cows.....	516,011	539,998	553,152	792,797	882,441
Other cattle.....	1,336,098	1,359,464	1,450,212	1,929,844	2,423,990
Sheep.....	336,423	382,331	420,770	493,607	485,446
Swine.....	922,221	1,038,102	804,328	1,340,179	1,479,188
British Columbia:—					
Horses.....	60,518	60,705	61,355	61,312	55,124
Milch cows.....	35,599	35,702	37,944	39,318	49,005
Other cattle.....	100,183	99,091	100,439	103,101	191,338
Sheep.....	45,000	45,000	46,494	46,269	43,858
Swine.....	34,541	39,031	38,543	37,829	37,688

TABLE of Meteorological Observations taken at the Central Experimental Farm, Ottawa, from April 1, 1917, to March 31, 1918; giving maximum, minimum, and mean temperature for each month and date of occurrence; also the rainfall, snowfall, and total precipitation.

Month.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	No. of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		Ins.	Ins.	Ins.		Ins.	
April.....	47.32	31.46	15.87	39.39	66.0	21	16.0	9	2.38	4.00	2.78	12	0.59	6
May.....	58.62	38.95	19.66	48.78	81.0	31	30.0	15	1.83	.....	1.83	11	0.63	23
June.....	73.47	53.04	20.43	63.25	85.1	13	36.8	6	2.58	.....	2.58	15	0.92	11
July.....	80.85	60.37	20.47	70.60	97.7	30	50.0	3	2.87	.....	2.87	18	0.95	10
August.....	78.45	57.28	21.16	67.86	99.6	1	46.0	31	3.40	.....	3.40	15	1.16	16
September.....	68.03	45.16	22.87	56.59	80.9	19	31.6	23	1.20	.....	1.20	11	0.64	30
October.....	49.11	35.69	13.42	42.40	61.6	19	24.9	21	5.17	.....	5.17	18	0.92	25
November.....	34.96	21.19	13.76	28.07	50.0	9	— 8.0	27	0.35	10.50	1.40	7	0.55	23
December.....	15.09	— 1.36	16.39	6.83	37.8	1	—30.8	30	0.26	27.00	2.96	14	1.00	9
January.....	12.10	— 2.20	14.31	4.95	27.0	12	—21.4	28	.....	31.50	3.14	15	1.30	12
February.....	19.92	— 1.76	21.68	9.08	41.4	20	—28.2	6	0.86	23.75	3.23	13	0.80	9
March.....	34.14	16.40	17.74	25.27	51.6	31	— 6.0	11	.....	19.25	1.92	11	0.70	10
									20.90	116.00	32.48	160		

Rain or snow fell on 160 days during the 12 months.
Heaviest rainfall in 24 hours, 1.16 inch on August 16.
Heaviest snowfall in 24 hours, 13.00 inches on January 12.
The highest temperature during the 12 months was 99.6° on August 1.
The lowest temperature during the 12 months was 30.8° on December 30.
During the growing season rain fell on 12 days in April, 11 days in May, 15 days in June, 18 days in July, 15 days in August, and 11 days in September.
November shows the lowest numbers of days with precipitation, viz., 7.
Total precipitation during the 12 months 32.48 inches, as compared with 37.18 inches during 1916-17.

RAINFALL, Snowfall, and Total Precipitation from 1890 to 1917-18; also the average annual amount that has fallen.

	Rainfall.	Snowfall.	Total pre- cipitation
1890.....	24.73	64.85	31.22
1891.....	30.19	73.50	37.54
1892.....	23.78	105.00	34.28
1893.....	31.79	72.50	39.04
1894.....	23.05	71.50	30.20
1895.....	27.01	87.50	35.76
1896.....	21.53	99.75	31.50
1897.....	24.18	89.00	33.08
1898.....	24.75	112.25	35.97
1899.....	33.86	77.25	41.63
1900.....	29.48	108.00	40.72
1901.....	29.21	97.25	38.91
1902.....	25.94	101.75	36.10
1903.....	26.43	85.00	34.92
1904.....	25.95	108.75	36.79
1905.....	23.71	87.25	32.42
1906, January 1 to March 31.....	1.90	24.50	4.34
1906-07.....	21.73	72.50	28.94
1907-08.....	24.70	134.75	38.18
1908-09.....	22.13	107.90	32.91
1909-10.....	28.40	61.25	34.51
1910-11.....	18.94	88.25	27.72
1911-12.....	20.12	98.50	29.95
1912-13.....	32.54	106.50	43.18
1913-14.....	21.51	70.25	28.51
1914-15.....	16.77	78.50	24.67
1915-16.....	22.66	130.00	35.65
1916-17.....	24.84	126.50	37.18
1917-18.....	20.90	116.00	32.48
Total for 28 years and 3 months.....	702.73	2,656.50	968.30
Average for 28 years.....	25.09	94.87	34.58

RECORD of Sunshine at the Central Experimental Farm, Ottawa, from April 1, 1917, to March 31, 1918.

Months.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
April.....	22	8	179.2	5.97
May.....	27	4	199.9	6.44
June.....	28	2	222.6	7.42
July.....	28	3	247.5	7.98
August.....	31	0	241.0	7.77
September.....	26	4	205.3	6.84
October.....	23	8	91.6	2.95
November.....	24	6	121.1	4.03
December.....	23	8	127.6	4.11
January.....	23	8	128.7	4.15
February.....	19	9	99.0	3.53
March.....	30	1	210.6	6.79

DISTRIBUTION OF SAMPLES.

The distribution of samples of seed grain, potatoes, flower seeds, fruit trees, and shrubs was again carried on during the past winter from the Central Farm at Ottawa and from the various branch Farms and Stations. The usual distribution of seed

SESSIONAL PAPER No. 16

grain was made from Ottawa, and from the branch Farms and Stations 3,680 samples of seed grain, 6,174 samples of potatoes, 1,912 samples of flower seeds, 5,198 samples of fruit trees and 386 samples of other trees and shrubs were sent out.

Some special distributions were also made, such as tobacco seed from the Central Farm; trees, shrubs, and tree seeds from the Farms in Saskatchewan; corn and vegetable seeds from the Quebec Stations; strawberry plants from Nappan, etc.

ENLISTMENTS.

Below are recorded the enlistments from the Experimental Farms Branch from April 1, 1917, to March 31, 1918: S. A. Bjarnason, J. Butler, H. Cannon, J. S. Chivers, P. Christopher, S. Cole, R. Cornish, W. H. Davies, W. I. Dutton, W. Fahey, A. Gallant, A. George, V. Gregory, Avelin Morley, and N. Pineau.

EXPERIMENTS AT FORT VERMILION, ALTA.

CHARACTER OF SEASON.

The first warm spring days occurred between April 12 and 22, and the snow disappeared rapidly, leaving the ground quite bare and exposed to the cold weather which followed. During this cold spell much damage was done to the alfalfa and to the shrubs and trees.

May continued cold until the middle of the month. Seeding started at the Station on the 7th, some days later than usual, and was general in the district by the 10th. Frost was recorded on twenty-one nights in May, but germination of seed was prompt, due to warm days and abundant moisture in the soil.

Growth was fair during June, although a frost on the first nipped the vegetable garden.

July and August were good growing months, with abundant rainfall. Prelude wheat was cut on the 13th, Daubeney oats on the 8th, and barley on the 13th of the latter month.

Dry weather during October has reduced the area of fall ploughing expected.

Cereals.—Six varieties of wheat tested ranged in yield from Marquis, 69 bushels per acre, to Prelude, 48 bushels 30 pounds. Seven sorts of oats yielded from 155 bushels 10 pounds for Garton's Regenerated Abundance to 81 bushels 6 pounds for Eighty-Day. Five varieties of barley varied in yield from 61 bushels 2 pounds from Success to 96 bushels 2 pounds from Canadian Thorpe. Spring rye yielded 60 bushels per acre, and fall rye 44 bushels. Two varieties of peas were tested, the Arthur giving a return of 47 bushels 32 pounds per acre and Prussian Blue 45 bushels 22 pounds. A plot of Premost flax yielded 31 bushels 4 pounds of seed and 1 ton 1,720 pounds of straw per acre.

Forage Crops.—The plots of alfalfa were badly winter-killed, and were ploughed up. Fresh seedings will be made.

Meadow fescue gave a yield of 2 tons 1,600 pounds hay per acre, and a plot grown for seed yielded 480 pounds per acre. Brome grass yielded 2 tons 1,500 pounds, timothy 2 tons 200 pounds, red top 2 tons 75 pounds, and rye grass 2 tons 1,200 pounds per acre. Three plots of millet yielded at the rates of 8 tons 350 pounds, 5 tons 470 pounds, and 5 tons 980 pounds per acre, respectively.

Three varieties of Indian corn were grown for fodder, Longfellow, Canada Yellow, and Quebec Yellow. The weights (green) for each were 28 tons 440 pounds, 20 tons 420 pounds, and 25 tons 290 pounds, respectively. Considering the late and cold spring, the corn made remarkable growth.

Four varieties of field carrots, four of mangels and six of field turnips were grown. Improved Short White gave the heaviest yield of carrots, 23 tons 1,580 pounds per acre; Selected Yellow Globe, among the mangels, with 24 tons 300 pounds; and Good Luck, among the turnips, 21 tons 660 pounds.

Two varieties of sugar beets, Vilmorin Improved and Klein Wanzleben gave a yield of 18 tons 480 pounds and 16 tons 1,360 pounds per acre, respectively.

In vegetables the following sorts were grown: Sweet or garden corn, two varieties matured sufficiently for table use, namely, Sioux Squaw and White Squaw; lettuce, radish, table carrots, table beets, parsnips, onions, table turnips, garden peas, beans, parsley, asparagus, rhubarb, cabbage, cauliflower, celery, pumpkins, cucumbers, squash, and tomatoes. These all did well, although the yield was lessened by drought in June.

The first sowing in the vegetable garden was on May 7, and in the hotbeds on April 25. Transplanting began May 22, except celery, which was kept in the beds until June 15.

Six varieties of potatoes were planted May 9 and 10, on well-prepared land. Rochester Rose gave the highest yield, 505 bushels 40 pounds per acre; and Irish Cobbler the lowest, 325 bushels 40 pounds.

All flowers, both annuals and perennials, made excellent growth and were greatly admired by visitors and added much to the attractiveness of the Station, which is in full view of the river and is usually visited by the passengers upon the arrival of the steamer.

TABLE of Meteorological Observations, taken at Fort Vermilion, Peace River District, Alberta, from April 1, 1917, to March 31, 1918, showing maximum, minimum, and mean temperature, the highest and lowest for each month, with date of occurrence, also, rainfall, snowfall, and total precipitation.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°							
April.....	42.25	10.89	31.36	26.57	57.9	14	-21.0	1	0.50	.....	0.50	1	0.50	8
May.....	58.98	29.31	29.66	44.14	80.2	10	11.0	2	0.41	.....	0.41	2	0.25	15
June.....	64.96	35.88	29.07	50.41	78.0	26	19.9	1	1.84	.....	1.84	5	1.12	3
July.....	74.15	43.21	30.93	58.67	88.5	4	33.2	9	2.15	.....	2.15	7	0.92	30
August.....	70.48	39.59	30.88	55.03	82.0	12	28.5	27	1.33	.....	1.33	10	0.76	2
September.....	64.24	25.99	38.25	45.11	84.0	22	13.9	26	0.14	.....	0.14	2	0.10	6
October.....	40.28	16.68	23.59	28.47	62.0	9	-12.0	28	0.82	2.00	1.01	7	0.40	2
November.....	35.28	9.27	26.01	22.27	60.0	3	-14.9	30	....	1.50	0.15	1	0.15	25
December.....	-19.26	-37.49	18.22	-28.38	-4.0	5	-64.0	27	....	6.75	0.66	6	0.15	31
January.....	-3.50	-26.64	23.14	-15.07	13.0	7	-65.0	25	....	11.25	1.12	8	0.27	23
February.....	1.21	-26.26	27.12	-12.70	41.0	23	-65.8	19	....	7.25	0.71	8	0.15	9
March.....	16.92	-16.16	33.08	0.38	44.0	31	-48.0	4	....	4.25	0.42	5	0.15	7
									7.19	33.00	10.44	62		

SESSIONAL PAPER No. 16

SOME Weather Observations taken at Central Experimental Farm, Ottawa, as compared with those taken at Fort Vermilion, Peace River District, Alberta.

	Mean Tem- perature.	Highest Tem- perature.	Lowest Tem- perature.	Total Precipi- tation.	Heaviest in 24 hours.	Total hours sunshine.	Average sunshine per day.
<i>April.</i>	°	°	°				
Ottawa.....	39.39	66.0	16.0	2.78	0.59	179.2	5.97
Fort Vermilion.....	26.57	57.9	-21.0	0.50	0.50	286.6	9.55
<i>May.</i>							
Ottawa.....	48.78	81.0	30.0	1.83	0.63	499.9	6.44
Fort Vermilion.....	44.14	80.2	11.0	0.41	0.25	296.3	9.55
<i>June.</i>							
Ottawa.....	63.25	85.1	36.8	2.58	0.92	222.6	7.42
Fort Vermilion.....	50.41	78.0	19.9	1.84	1.12	280.9	9.36
<i>July.</i>							
Ottawa.....	70.60	97.7	50.0	2.87	0.95	247.5	7.98
Fort Vermilion.....	58.67	88.5	33.2	2.15	0.92	297.7	9.60
<i>August.</i>							
Ottawa.....	67.86	99.6	46.0	3.40	1.16	241.0	7.77
Fort Vermilion.....	55.03	82.0	28.5	1.33	0.76	305.9	9.86
<i>September.</i>							
Ottawa.....	56.59	80.9	31.6	1.20	0.64	205.3	6.84
Fort Vermilion.....	45.11	84.0	13.9	0.14	0.10	244.8	8.16
<i>October.</i>							
Ottawa.....	42.40	61.6	24.9	5.17	0.92	91.6	2.95
Fort Vermilion.....	28.47	62.0	-12.0	1.01	0.40	128.1	4.13
<i>November.</i>							
Ottawa.....	28.07	50.0	-8.0	1.40	0.55	121.1	4.03
Fort Vermilion.....	22.27	60.0	-14.9	0.15	0.15	81.4	2.71
<i>December.</i>							
Ottawa.....	6.83	37.8	-30.8	2.96	1.00	127.6	4.11
Fort Vermilion.....	-28.38	-4.0	-64.0	0.66	0.15	80.8	2.60
<i>January.</i>							
Ottawa.....	4.95	27.0	-21.4	3.14	1.30	128.7	4.15
Fort Vermilion.....	-15.07	13.0	-65.0	1.12	0.27	72.0	2.32
<i>February.</i>							
Ottawa.....	9.08	41.4	-28.2	3.23	0.80	99.0	3.53
Fort Vermilion.....	-12.70	41.0	-65.8	0.71	0.15	94.8	3.38
<i>March.</i>							
Ottawa.....	25.27	51.6	-6.0	1.92	0.70	210.6	6.79
Fort Vermilion.....	0.38	44.0	-48.0	0.42	0.15	166.1	5.35

9 GEORGE V, A. 1919

RECORD of Sunshine at Fort Vermilion, Peace River District, Alberta, from April 1, 1917, to March 31, 1918.

Months.	Number of days with sunshine.	Number of days without sunshine.	Total hours sunshine.	Average sunshine per day.
April.....	28	2	286.6	9.55
May.....	30	1	296.3	9.55
June.....	26	4	280.9	9.36
July.....	29	2	297.7	9.60
August.....	30	1	305.9	9.86
September.....	30	0	244.8	8.16
October.....	23	8	128.1	4.13
November.....	22	8	81.4	2.71
December.....	20	11	80.8	2.60
January.....	16	15	72.0	2.32
February.....	18	10	94.8	3.38
March.....	28	3	166.1	5.35

EXPERIMENTS AT GROUARD, ALTA.

The spring was late in opening. May and the first half of June were cold, retarding germination and growth. The latter half of June and the early part of the month of July were very hot, however, with good rainfall, so that growth was rapid. Unfortunately a drought followed, and on July 22 a severe hailstorm visited Grouard and did much damage to the crops. The weather during the rest of the season was ideal for growth and harvesting operations.

Three varieties of wheat, three of oats, two of barley, one of peas, and one of fall rye were grown. The yields of all were much lessened by the hailstorm referred to.

The vegetable garden suffered from the late spring, the drought of July, and the hailstorm. Beets, cabbage, carrots, celery, cauliflower, lettuce, onions, parsnips, radish, and turnips did well. Table corn has not yet succeeded at Grouard. Squash, cucumbers, and melons also failed, partly on account of damage from hail. Some tomatoes were picked and ripened in the house.

In field roots, mangels and turnips did only fairly well; the stand was uneven, and the turnips suffered from the white grub. Carrots gave a good yield.

Indian corn, of which three varieties were tried, was not a success. It will be tried further, however, before a decision is formed as to its possibilities in this region.

Western rye grass, red top, timothy, awnless brome, alfalfa, red clover, and alsike, all sown with oats as a nurse crop, made a good catch and went into winter in good condition.

EXPERIMENTS AT BEAVERLODGE, ALTA.

Speaking generally, the season at this point was a favourable one, and excellent results were obtained from the experimental work in cereals, forage plants, and vegetables. Late in August there was some damage from frost to wheat roots in the district, although these crops on the Station were not noticeably affected. Field peas, however, were seriously injured.

Of three varieties of wheat, Huron yielded the highest, 24 bushels 50 pounds per acre, and Prelude the lowest, 18 bushels 20 pounds. Four varieties of oats varied in yield from 80 bushels 30 pounds for Victory to 68 bushels 13 pounds for Abundance. Three varieties of barley were tested, the highest, O.A.C. No. 21, yielding 39 bushels 23 pounds, and the lowest, Early Chevalier, 35 bushels 10 pounds.

SESSIONAL PAPER No. 16

In forage plants, alfalfa has withstood two out of three winters well and only partially winter-killed during the severe winter of 1915-16. Red clover has stood one winter perfectly, one fairly well, but winter-killed completely in 1915-16. In 1917, abundant rainfall during late May and early June resulted in a good hay harvest; the yields were as follows: Western rye grass, 3 tons 1,838 pounds per acre; timothy, 2 tons 603 pounds; meadow fescue, 2 tons 650 pounds; red clover, 1 ton 1,720 pounds; alsike, 2 tons 743 pounds; and alfalfa, 2 tons 789 pounds.

In field roots, four varieties of turnips ranged in yield from 13 tons 1,364 pounds for Magnum Bonum to 11 tons 897 pounds for Bronze Top. Mangels (four varieties) varied from 8 tons 1,312 pounds for Giant Yellow Intermediate to 5 tons 1,727 pounds for Giant Half Sugar White. Two varieties of carrot, Ontario Champion and White Belgian, gave yields of 6 tons 1,822 pounds and 5 tons 52 pounds, respectively.

In horticulture, the excessive rainfall early in the season was unfavourable, but thorough cultivation later overcame this setback, and satisfactory yields of vegetables of good quality were, in most cases, obtained. Squash, garden peas, beets and turnips, lettuce, radish, parsley, cauliflower, parsnips and carrots all did well. Some experiments as to best dates of sowing were conducted, and will be repeated for a series of years.

Most of the apple trees planted out are making good growth. The currant bushes have grown well, and some varieties have fruited lightly. The raspberries and gooseberries have made good growth, but have not yet fruited. Strawberry plants, although set out under favourable conditions as soon as received, did not survive.

A number of varieties of ornamental trees and shrubs have made fair to good growth.

In July, 1917, arrangements were made to carry on more extensive experiments at Beaverlodge on a larger area. Considerable preparatory work was done in the fall in the way of breaking and fencing, and plans were drawn up for commencing the wider range of work in the spring of 1918.

TABLE of Meteorological Observations taken at Beaverlodge, Alberta, from April 1, 1917, to March 31, 1918, showing maximum, minimum, and mean temperature, the highest and lowest for each month with date of occurrence, also, rainfall, snowfall, and total precipitation.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		Ins.	Ins.	Ins.		Ins.	
April.....	44.13	25.15	18.98	34.64	57.0	28	7.0	1	0.17	.....	0.19	3	0.15	21
May.....	57.01	34.19	22.82	45.60	78.0	8	17.0	2	1.38	6.70	2.05	13	0.81	16
June.....	64.86	41.76	23.10	53.31	78.0	28 to 30	35.0	1 & 13	0.93	.....	0.93	6	0.41	4
July.....	72.95	45.80	27.14	59.37	84.0	15 & 18	32.0	29	1.99	.....	1.99	5	1.75	28
August.....	69.88	43.40	26.48	56.64	84.0	19	30.0	26	1.57	.....	1.57	8	0.90	2
September...	61.30	34.80	26.50	48.05	78.0	21	19.0	24	0.21	.....	0.21	4	0.09	2
October.....	45.80	28.11	17.69	36.95	71.0	9	3.5	21	0.58	9.00	1.48	8	0.60	27
November...	46.90	29.10	17.80	38.00	65.0	18	-14.0	30	0.19	2.00	0.39	2	0.19	22
December...	-5.48	-19.22	13.74	-12.35	42.0	31	-44.0	28	.....	26.00	2.60	12	0.50	9
January.....	14.90	-0.32	15.22	7.29	44.0	1	-36.0	29	0.25	8.75	1.12	6	0.50	18
February....	18.85	-2.17	21.03	8.34	43.0	22	-34.0	18	.....	12.00	1.20	6	0.40	9
March.....	29.09	7.67	21.41	18.37	48.0	15	-27.0	5	0.16	12.00	1.36	7	0.50	3
	.....	.....	.....	.....	.....	.....	.....	.....	7.43	76.45	15.09	80	.....	.....

9 GEORGE V, A. 1919

EXPERIMENTS AT FORTS SMITH, RESOLUTION AND PROVIDENCE,
NORTHWEST TERRITORIES.

FORT SMITH.

The land for the vegetables and roots had been prepared in the fall of 1916, and was ready for sowing in good time in the spring. The following were sown on May 12: Carrots, four white varieties, four red varieties; beets, six varieties; turnips, six varieties; onions, four varieties.

The weather at seeding time was warm and dry, and the drought continued resulting in slow germination. It was the end of May before the first green shoots appeared above ground.

The cabbage, lettuce, tomatoes, and some varieties of onions, sown in the hotbed, did well and promised a good crop after planting out, but were destroyed by a veritable invasion of grasshoppers and grubs.

The five varieties of potatoes planted took more than a month to appear above ground and, just at blossoming time, in July, were destroyed by frost, as were the turnips. A fresh sowing of the latter was made, and the good rainfall in August helped their growth. The grubs destroyed many, but some turnips weighing 5 to 6 pounds each were harvested.

Considerable protection was afforded against grasshoppers by digging trenches round the crops, by the use of Paris green spray, and by placing tar-paper discs round the stalks of cabbage.

The crop of oats, on the St. Bruno farm nearby, was excellent.

Wheat again did not succeed. It will be tried next year on a newly-cleared piece of land, which it is thought may be more favourably situated.

FORT RESOLUTION.

The spring was very backward. Most seeds were sown in the hotbeds in April. Although May was cold, with high winds, the land was got ready in the garden, transplanting from the hotbeds done, and other seeds sown in the open. There were some hot days in the latter part of June, with good rainfalls, but the presence of ice in the lake kept the temperature generally low and retarded growth. Warm weather came suddenly on July 8 and lasted until August 17, with occasional rains, and growth was rapid. On August 17 the temperature fell, there was severe frost, and all grain crops were practically destroyed. The oats were 4 feet high and some of the wheat 5½ feet when frost came.

Hotbeds were tried for the first time, with excellent results.

In vegetables, cabbage, cauliflower, onions, radish, turnips, carrots, beets, peas, lettuce and potatoes yielded fairly well; many other varieties were destroyed by the August frost.

Plum, cherry and apple trees made fair growth but have not yet bloomed. The yields of strawberries, raspberries and gooseberries were lighter than usual.

The showing of flowers in August and September was magnificent.

FORT PROVIDENCE.

All crops were again threatened with destruction by a plague of grasshoppers but, fortunately, frequent cold rains and white frost on June 14 killed nearly all. A fresh swarm came about the end of June, but by that time growth was vigorous and food so abundant everywhere that little damage was done to the crops.

Potatoes were planted May 22-25. In spite of unfavourable conditions, such as being obliged to use half-broken oxen for ploughing, and lack of labour for cultivating, weeding and harvesting, the yield was good. There was no damage from frost.

SESSIONAL PAPER No. 16

In vegetables, lettuce, carrots, beets, turnips, peas, onions, cabbage, and cauliflower did well. Tomatoes reached a stage so that they could be ripened in the house after picking.

In grains, Prelude wheat, from seed acclimatized for several years, yielded a good, well-matured crop. The same variety received direct from Ottawa did not mature. This was, perhaps, partly due to the unfavourable situation of the second plot.

Oats and barley ripened well.

EXPERIMENTS AT SALMON ARM, B.C.

Some experimental work with fruit was continued by Thos. A. Sharpe on his farm at the above point.

The season of 1917-18 was abnormal. The winter of 1916-17 showed extreme ranges of temperature, which caused severe winter-killing of fruit trees.

A number of varieties of apple fruited in 1917 for the first time, and some may, on further test, prove valuable. Some thirty varieties from the Central Farm at Ottawa were set out, and have so far made good growth. It is thought that, with the abnormally severe seasons occasionally experienced at Salmon Arm, the best results with fruit trees will be obtained by planting good varieties grown from seed in a severe climate.

In pears, the Dr. Jules Guyot appears best suited for the district. The plum trees so far planted have suffered considerably from the severe winters of 1915-16 and 1916-17. The Italian Prune, Green Gage, and Washington will do well under normal winter conditions. Morello and Duke cherries are the only varieties hardy enough for this district. Peaches have been practically abandoned. No varieties of grapes fruited in 1917 owing to winter injury. The Snyder blackberry was the only one to fruit last year. Raspberries, red, white, and black currants yielded very well.

METEOROLOGICAL record at Salmon Arm for the year ending March 31, 1918.

1917.	Date of highest temperature	Degree.	Date of lowest temperature	Degree.	Rainfall.	Snowfall.	Sunshine.
					Inches.	Inches.	Hrs. Min.
April.....	15—30	61	12	23	1.96	4	169 54
May.....	10	80	4	27	1.09	.....	208 54
June.....	14	85	9	38	1.86	.....	201 12
July.....	19	95	30	42	0.07	.....	353 06
August.....	16	92	31	43	1.30	.....	311 18
September.....	16	79	26	35	1.41	.....	187 48
October.....	3	81	30	25	1.11	3	135 24
November.....	14	57	25	24	0.76	4½	57 30
December.....	18	50	23	— 3	0.16	35½	32 18
1918.							
January.....	2	41	30	— 14	.....	62	25 18
February.....	10	43	20	— 7	0.10	16	66 00
March.....	29	56	5	3	0.29	1½	104 18
Totals.....	.....	.....	.....	.....	10.11	126½	1,853 00

EXPERIMENTS AT SWEDE CREEK, DAWSON CITY, Y.T.

Arrangements were completed during the summer for the carrying on of a limited amount of experimental work on an area of 20 acres on the farm of Mr. Jas. Farr at the above point, and some preliminary work was done in the way of fall ploughing, etc., in preparation for seeding operations in the spring of 1918. For climatic reasons, and owing to the difficulty of transporting supplies, fertilizers, farm implements, etc., the amount of work which it will be possible to carry on at this point will be small, but it is hoped that some interesting and profitable results may be obtained.

DIVISION OF CHEMISTRY.

REPORT OF THE DOMINION CHEMIST, FRANK T. SHUTT, M.A., D.Sc.

The year's work has been more particularly marked by an increased correspondence from farmers, a large influx of samples of an agricultural nature sent in for examination or analysis, and a very considerable addition to the purely analytical work of the Division in the matter of samples of food products submitted in connection with the Oleomargarine Act and supplies purchased in Canada for the British War Office and civilian use overseas.

It is a matter of satisfaction to record that farmers are more and more availing themselves of what may be termed the educational and advisory assistance offered by the Division. This phase or branch of the Division's activities permits the direct meeting of the needs of the individual—the man on the land—in the solution of his particular problems, and undoubtedly has very materially assisted in the campaign for increased production of foodstuffs throughout the Dominion.

The number and nature of the samples submitted to examination and reported on during the year are recorded in the following table:—

SAMPLES received for Examination and Report during the twelve months ending
March 31, 1918.

Samples.	British Columbia.	Alberta.	Saskat- chewan.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Total.
Soils.....	44	193	5	2	28	37	6	4	.....	319
Muds, mucks and marls.....	2	.....	3	.....	3	13	5	21	3	50
Manures and fertilizers.....	6	2	.....	.....	31	47	18	15	3	122
Forage plants, seeds and fodders.....	18	31	14	8	132	38	12	8	2	253
Waters, including rain and snow.....	9	29	28	4	146	16	2	6	4	244
Samples from Meat and Canned Goods Division.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	840
Miscellaneous, including dairy pro- ducts, fungicides, insecticides, etc..	14	24	13	2	215	59	7	12	7	353
War Office samples (flours).....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,668
	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,849

EXAMINATION OF SOILS FOR FARMERS.

More than 200 samples of soil sent in by farmers have been examined and reported on. These have not been submitted to a complete chemical analysis. Apart from the fact that it would have been quite impossible to undertake a work of such magnitude in addition to our other labours, the value of the results for the purpose in view would in no wise be commensurate with that of the time expended thereon. It must be pointed out that chemical analysis, though of fundamental importance in connection with virgin areas, is in itself insufficient as a guide to the quantities and forms of plant food that will give a profitable response, when considering soils of long cultivation. The final court of appeal for such information is, in the majority of cases, the soil itself; practical trials, fertilizer experiments, must be resorted to for final and conclusive evidence on this point.

We are, however, able, from the examination made, to give the farmer information of a suggestive and valuable character as to treatment with manures, fertilizers, the necessity or otherwise of drainage and liming, the presence of alkali, suitable crops,

SESSIONAL PAPER No. 16

etc., and chemical and physical work on the samples to that end is performed. In order that this work of diagnosis may be the more effective, it is required that the farmer shall collect the soil sample in accordance with instructions issued by the Division and, on the "form" supplied, furnish information as to the history of the soil as regards its manuring and cropping, the nature of the subsoil, drainage, and the outstanding features of the climatic conditions of the district.

INVESTIGATIONAL WORK WITH FERTILIZERS.

Experiment "A".—The plan of this experiment includes 48 fertilized or manured plots on which the treatment is varied with a view to ascertaining the most economic quantity and proportional composition of a fertilizer, as measured by its influence throughout the period of a three-year rotation consisting of (1) potatoes or other hoed crop, (2) grain, (3) hay.

The experiment was introduced, in the year 1915, on the Farms and Stations of the Experimental Farms system at Charlottetown, P.E.I., Kentville, N.S., Fredericton, N.B., Cap Rouge, Que., and Agassiz, B.C., and, the following year, at Nappan, N.S., Lennoxville, Que. and Sidney, B.C.

The final returns from the experiment at the five first-mentioned stations are now available. Prominent features noted in the results from the individual stations include the very decided influence of phosphoric acid at Charlottetown, where it proved the limiting fertilizer factor. By increasing the quantity of phosphatic fertilizer applied, the profitable use of larger nitrogenous applications was permitted, whereas, with inadequate phosphoric acid, an increase in the amount of nitrogen proved ineffective.

On the light, sandy loam soil at Kentville, the plots with manure and fertilizers produced yields superior to those from either manure or fertilizers alone. Indeed, at all the stations the combinations of manure and fertilizers ranked highly and took highest place in the averages.

At Fredericton, the heaviest fertilizer applications were found both most productive and most profitable.

A study of the average returns from five stations is most interesting and reveals the fact that, without a single exception, the fertilizers were profitably employed.

The average profit—for the three years—from the plots receiving both manure and fertilizers was over \$30 per acre, while the average profits from fertilizers alone during the same period was slightly over \$15 per acre.

These calculations are based on the normal pre-war prices of all the commodities. Under present conditions of the market—notwithstanding the increased cost of fertilizers—the profits would appear greater.

Experiment "B".—This experiment is conducted concurrently with "A" at the Farms and Stations already named. It is designed to ascertain the relative merits of nitrate of soda and sulphate of ammonia as sources of nitrogen, and of acid phosphate, basic slag, and bone meal as source of phosphoric acid. At all five stations, nitrate of soda has proved superior to sulphate of ammonia and, at four, acid phosphate appears to have been more effective than either basic slag or bone meal.

Experiment on Flax.—This experiment was conducted in co-operation with the Economic Fibre Division at the Central Experimental Farm, with the object of ascertaining the influence of fertilizers on the yield and quality of the flax fibre. At present only the total yields have been recorded. The experiment contained 15 plots, 3 of which were checks. The others were variously fertilized. The mixture which proved most profitable consisted of 200 pounds of nitrate of soda, 400 pounds acid phosphate, and 125 pounds muriate of potash per acre. This produced an increase of 1,410 pounds of straw per acre over the average yield from the check plots. Each fertilized plot outyielded the checks, the average increase being 873 pounds per acre.

9 GEORGE V, A. 1919

Experiment on Seed Mangels.—This experiment was carried out in co-operation with the Forage Crop Division, at the Central Experimental Farm. Substantial increases in seed production attended the use of the various fertilizers. The average yield from the fertilized plots was 1,208 pounds of seed per acre, as compared with an average of 855 pounds from the check plots.

The most profitable treatment seems to have been 150 pounds nitrate of soda, 800 pounds acid phosphate, and 120 pounds muriate of potash per acre, used in conjunction with 12½ tons of manure, the yield of seed thereby produced being 1,460 pounds per acre.

Experiment with Nitrate of Lime.—With the object of ascertaining the fertilizing value of nitrate of lime (Norwegian saltpetre) as compared with that of nitrate of soda and sulphate of ammonia, this experiment was conducted. Unfortunately, seasonal and soil conditions proved unfavourable, and, in consequence, the yields throughout were exceptionally small. The results indicated, however, that the nitrogen in nitrate of lime has proved quite as efficacious as that in either nitrate of soda or sulphate of ammonia.

Experiment with "Rito"—a humatized Peat.—This material, obtained from England, is said to be a chemically treated peat, though the nature of the treatment is not apparent.

The results of the experiments, conducted at the Central Experimental Farm, have furnished no evidence of any appreciable fertilizing influence having been exerted by the material.

Experiment with Nepheline Syenite.—A pot experiment in the greenhouse has been commenced with a view to ascertaining the value of finely ground nepheline rock as a source of potash. The experiment has not yet reached a stage where the drawing of inferences would be warrantable.

Experiment, Plan E.—This is a new scheme which—in modified form—was introduced at Lacombe, Alta., and Summerland, B.C., in 1917. This year (1918) it has been adopted at six of the eastern stations, and will be continued for a period of three years. In the plan several new features have been introduced, some with the object of solving problems which have lately arisen.

FERTILIZER MATERIALS.

Ground Limestone.—Every season furnishes additional proof of the statement that there are many soils in Eastern Canada upon which lime or ground limestone may be profitably used. Their value as amendments for sour soils, soils rich in humus but deficient in lime, and heavy clay loams, has been abundantly shown. Our correspondence indicates that farmers are paying more attention to this subject, and we have, at the request of agricultural societies and provincial departments of agriculture, analysed a number of limestones and reported upon them as to their value for the purpose of making crushed or ground limestone. The larger number of the samples have come from the Maritime Provinces, and in the majority of instances they have been shown to be of excellent quality, containing over 90 per cent of carbonate of lime.

In this connection it may also be stated that a number of samples of marl have been analysed. These have been chiefly from deposits in Ontario and Quebec. Air dried marl of good quality will contain from 70 to 95 per cent of carbonate of lime. It is a lime compound particularly suitable for soil treatment, and may often be procured at little cost above that of hauling. Marl deposits are of not infrequent occurrence in Eastern Canada and in British Columbia.

Wood Ashes.—Owing to the war, the German potash compounds which supplied the fertilizer trade of the world are unobtainable. Attention must therefore be paid to home sources of this valuable element. Chief among these sources in Canada may

SESSIONAL PAPER No. 16

be placed wood ashes, which, in addition to their potash content (5 to 6 per cent), contain notable amounts of phosphoric acid and lime. Samples analysed during the year have shown great variation in their potash content, evidently due to the degree of care with which the ashes have been collected and preserved. It is all-important that this valuable fertilizer should not be thrown out and wasted. In their preservation and storage it is particularly desirable that the ashes should be protected from leaching rains.

Ashes from city incinerators and other sources have also been examined and reported on as to their fertilizing value.

Swamp Muck and Peat.—These materials may frequently be found to have a manurial value in furnishing humus-forming material and nitrogen. Generally speaking, they are improved and their plant food rendered more available if first composted or used as a supplemental litter to absorb liquid manure. The number of samples sent in for examination indicates that farmers are becoming more and more aware of the value of these naturally-occurring materials for improving their soils. Air-dried peat has a very considerable absorbent value and good samples will contain about 75 per cent organic matter and from 1.5 per cent to 2.5 per cent of nitrogen.

Miscellaneous Materials of Fertilizing Value.—The year's work includes the analysis of a number of materials, waste products from manufacturing processes and natural deposits, etc., to determine their fertilizing value.

Utilization of Nitre Cake in the manufacture of Superphosphate.—Nitre cake is the residue from the manufacture of nitric acid from Chili saltpetre (sodium nitrate) and is at present largely a waste product. Our investigational work, still in progress, indicates that it may find a useful purpose in the treatment of rock phosphate for the manufacture of superphosphate. Though not so efficient for this purpose as sulphuric acid, the data so far obtained are very encouraging, several grades of superphosphate with notable percentages of available phosphoric acid having been prepared.

Nepheline Syenite.—This is a potash-bearing silicate rock, and experiments are in course to ascertain to what degree its potash may be rendered available for crop use by (1) grinding to a fine degree of fineness, and (2) treatment with sulphuric acid in conjunction with natural phosphates. Although a considerable amount of work has been done in this research, the investigation has not yet proceeded far enough to warrant any prediction as to the economic value of this material as a source of agricultural potash.

FERTILIZING VALUE OF RAIN AND SNOW.

The eleventh year of this investigation, which has for its object the determination of the nitrogen compounds (free and albuminoid ammonia and nitrogen in nitrates and nitrites) in the rain and snow, closed on February 28, 1918. During the year 68 samples of rain and 35 of snow were analysed. The total precipitation was 32.86 inches (rain 19.99 inches, snow 128.75 inches) and the total nitrogen supplied thereby amounted to 6.259 pounds per acre.

Summarizing the data we obtain the following interesting figures, the averages for the preceding decade being added for the purpose of comparison:—

AMOUNTS of Nitrogen furnished by Rain and Snow.

	By rain, pounds per acre.	By snow, pounds per acre.	Total, pounds per acre.
Year ending February 28, 1918.. . . .	4.719	1.540	6.259
Average for 10 years ending February 28, 1917.. . . .	5.482	1.101	6.583

From the agricultural standpoint this enquiry has contributed materially to our knowledge regarding the value of the precipitation as a source of available nitrogenous crop food.

SESSIONAL PAPER No. 16

These results, in the majority of cases, are somewhat higher than the average obtained from the data of the past five years, indicating not only that good seed was used but that favourable seasonal conditions for the beet crop prevailed at the larger number of points.

FIELD ROOTS.

Continuing our work on the relative feeding values of field roots—mangels, turnips, and carrots—commenced 13 years ago, the following summaries may be presented from analyses made of the 1917 crop. All the roots examined were grown on the Experimental Farm, Ottawa.

Mangels.—Thirty-one varieties were tested, including those of the several types generally recognized and for sale by seedsmen.

MANGELS, 1917.

	Dry matter.	Sugar in juice.
Maximum..	17.28	11.50
Minimum..	8.72	3.86
Average of 31 varieties..	12.64	6.72
“ for 13 years..	10.97	5.70

The series included a fairly large number of the best varieties from the standpoint of nutritive value, but it may also be remarked that the season at Ottawa was particularly favourable to the root crop. The averages for dry matter and sugar have only twice previously been equalled in this investigation and never exceeded.

To ascertain the influence of inherited qualities, Gate Post and Giant Yellow Globe, representatives of two distinct and well-recognized types of mangel, have been grown side by side at Ottawa under similar conditions of soil, etc., annually for a period of 18 years, and the crop analysed. The results have shown, without a single exception, that, both in dry matter and sugar, the Gate Post is superior to the Giant Yellow Globe.

GATE POST and Giant Yellow Globe Mangels.

	Dry matter.	Sugar in juice.
Gate Post—1917 crop..	14.24	7.41
“ “ average for 18 years..	11.71	6.11
Giant Yellow Globe—1917 crop..	11.39	5.89
“ “ “ average for 18 years.	9.56	4.62

Though, as our detailed results clearly show, the composition of the mangel is influenced by seasonal conditions, the above data furnish satisfactory proof that distinct varieties possess in a marked degree qualities due to heredity, and which may be transmitted. The results of this investigation point to the desirability of farmers paying more attention in their selection to the matter of composition (nutritive value) and not relying solely on the matter of yield.

Turnips.—Fifty-nine varieties of turnips (swedes and fall turnips) were analysed, the series including a number tested for the first time in 1917.

TURNIPS, 1917.

	Dry matter.	Sugar in juice.
	p.c.	p.c.
Maximum.....	13.59	2.16
Minimum.....	9.29	1.10
Average for 1917.....	11.04	1.41
Average for 12 years.....	10.30	1.25

The foregoing data indicate that a very considerable difference in percentage of dry matter may exist, as with mangels, among the varieties of turnips. Yield and keeping qualities are essential factors in the selection of the varieties to be grown, but the results clearly emphasize the importance of paying some regard to the matter of composition. Though in many instances turnips closely approach or equal mangels in dry matter content, they are decidedly inferior as a class to mangels as regards sugar.

The summarized particulars for the swede (45 varieties) and fall (13 varieties) turnips may be presented as follows:—

SWEDE and Fall Turnips, 1917.

	Swede.		Fall.	
	Dry matter.	Sugar in juice.	Dry matter.	Sugar in juice.
Maximum.....	13.59	2.17	11.16	1.46
Minimum.....	9.39	1.03	9.29	0.88
Average.....	11.05	1.45	10.13	1.19

From this series we may conclude that the swede is decidedly more nutritious than the fall turnip; the former contains a notably higher percentage of dry matter and is slightly the richer in sugar.

Carrots.—Thirteen varieties of carrots were examined in 1917. The series included those which had been tested for a number of years, together with two or three more recently introduced varieties.

CARROTS, 1917.

	Dry Matter.	Sugar in Juice.
Maximum.....	15.55	3.73
Minimum.....	11.19	2.33
Average of 13 varieties, 1917.....	12.69	2.92
Average for 12 years.....	9.83	2.51

The season was evidently most favourable for the development of this class of field root, the highest averages, for both dry matter and sugar, being obtained in the investigational period of 12 years. A notable variety in the series was the Yellow Intermediate, with nearly 2 per cent more dry matter than the next highest; five varieties contained over 13 per cent dry matter and five between 12 per cent and 13 per cent.

The following interesting table summarizes the data for the period of the investigation:—

AVERAGE Composition of Mangels, Turnips and Carrots.

Class of Root.	Period.	Dry Matter.	Sugar in Juice.
Mangels.....	13 years	10.97	5.70
Turnips.....	12 “	10.30	1.25
Carrots.....	12 “	9.83	2.51

SESSIONAL PAPER No. 16

FEEDS AND FEEDING STUFFS.

Consequent upon war conditions, the price of feeds and feeding stuffs in general has greatly advanced during the past year. Further, as a result of the same conditions, many mill feeds of an exceedingly poor character—chiefly by-products from the oatmeal mills—have been put on the market, many of them at prices far exceeding their value. As might be expected, therefore, our correspondence from farmers seeking information and advice in this matter has been very large. More than 250 samples of feeds submitted by farmers and dairymen have been analysed and reported on as to nutritive value. As far as might be practicable or possible, advice has been given as to the desirability of purchasing at the prices asked, the probability of the economical use of the feeds in question and their relative value as compared with standard feeds on the market.

The feeds examined include bran, shorts, middlings, feed flours, wheat germs, oil cake meal, cotton-seed meal, elevator screenings, gluten feeds, corn feeds, barley feeds, oat feeds, fish meal, tankage, mixed ground mill feeds, cocoanut meal and a number of proprietary feeds sold under brand names, for pig feeding, dairy stock, poultry, etc. A number of grasses, hays, and ensilages were also analysed.

The subject is altogether too large and too varied in character to be satisfactorily treated of in summarized form, but a bulletin giving the more important features of the work is now in course of preparation.

FLOUR.

The official examination of flours purchased in Canada for the British War Office and civilian supplies overseas has been continued. The year's work includes the analysis of 1,668 samples as to moisture content.

A very considerable amount of investigatory work has been done in the determination of moisture *in vacuo*, and in different types of drying ovens. A satisfactory method has been evolved in which 2 grams of flour are heated for 5 hours to 100° C. in a Freas electric vacuum oven.

MEAT INSPECTION DIVISION WORK.

The work in the examination of packing house products, etc., submitted by the Meat Inspection Division, Health of Animals Branch, for the year 1917-18, has comprised 840 samples, which may be classified as follows:—

Preserved meats, sausages..	35
Lards, tallows, oils, butters..	284
Dye stuffs, colouring matters..	71
Preservatives, pickling solutions..	79
Spices, condiments, etc..	35
Evaporated apples, canned fruits and vegetables..	281
Miscellaneous..	55
Total..	840

A method for the detection of the presence of solid fat adulterants in lard was critically examined and very satisfactory results obtained. The process permits the possibility of establishing the presence of any foreign fat, including hardened or hydrogenated oils, containing the glyceride, tristearin. Adulterants of the nature of hydrogenated cotton-seed or soya bean stearin may be detected by this method when present in as small a proportion as 1 per cent.

The Oleomargarine Act came into force during the year, the chemical work necessarily involved in its administration falling upon this Division. The chief examination in connection therewith has been the critical analysis of the butters used in the manufacture of this product, with the view of determining their freedom from artificial colouring matter. The several methods described in the standard texts for

the detections of added colour in butter and butter compounds were all found more or less unsatisfactory and inconclusive. As a result of this review, a method was finally adopted which reveals the presence of oil-soluble coal tar dyes or vegetable colours when present in the proportion of 1 part of dye or colour to 50,000 of fat. Approximately, 150 samples of butter have been examined by this method since the Act came into force. The reports in connection with the samples submitted by the Meat Inspection Division are made to the Veterinary Director-General.

INSECTICIDES AND FUNGICIDES.

The very marked increase of late in the price of Paris green, consequent upon war conditions, has directed the attention of horticulturists and manufacturers of insecticides to other and cheaper arsenicals for spraying purposes. Prominent among these compounds are arsenate of lime (calcium arsenate) and arsenite of lime (calcium arsenite). A number of samples of both preparations have been analysed and reported on as to composition and arsenic content. Both of these compounds are very much cheaper than Paris green or arsenate of lead.

Arsenate of Lime.—This has been put upon the market in both paste and powder form. Reliable brands in the dry powder form contain arsenic equivalent to, approximately, 40 per cent arsenic oxide, less than 1 per cent of which is soluble in water. One brand analysed contained 32.75 per cent arsenic oxide. The arsenical content of the paste forms is about half that of the dry powder, but necessarily will be variable, dependent upon the percentage of water present. A very considerable amount of practical experimental work has been done with this compound by the Entomological Branch and its efficiency as an insecticide has been established. It is advised, however, in order that there may be no risk of injuring the foliage, that it should always be used in Bordeaux mixture, lime-sulphur solution, or other of the sulphide sprays, with all of which it suffers no deterioration or loss of toxic value. Thus used it has proved an efficient and safe spray for apples and potatoes.

Arsenite of Lime.—There is as yet but little reliable evidence from field and orchard experiments as to the practical value of arsenite of lime as a spray. There is no doubt as to its toxic properties, but more work is necessary before its position as a safe spray for orchard work, i.e., one which can be used without injury to foliage, can be established. There seems, however, little doubt but that it will be found an effective and safe insecticide for the potato crop, if used in Bordeaux mixture or with an excess of lime in the spray. Several brands of arsenite of lime have been analysed, showing an arsenious oxide content varying from 14 to 24 per cent.

Manufacturers of these compounds should state plainly and distinctly on the label of the package the form (arsenate or arsenite) in which the arsenic is present and the percentage of arsenic in the compound and the net weight of the arsenical in the package.

Among the insecticides and fungicides examined were sodium cyanide, Paris green, arsenate of soda, bluestone, nicotine extracts, formaldehyde, and several preparations put out as gopher poisons.

WELL WATERS FROM FARM HOMESTEADS.

The examination of well waters for farmers, a feature of the work of the Division for the past thirty years, continues to meet with a wide appreciation throughout the Dominion.

Our reports show that of the waters submitted during the year 22 per cent were pronounced pure and wholesome, 20 per cent suspicious and probably dangerous, 26 per cent seriously polluted, and 32 per cent as too saline to be potable.

Samples of water for analysis must be forwarded in accordance with the directions issued by the Division and obtainable on application. The examination is made free of charge but express charges must be prepaid.

DIVISION OF FIELD HUSBANDRY.

REPORT OF THE ASSISTANT DOMINION FIELD HUSBANDMAN,
W. L. GRAHAM, B.S.A.

The Field Husbandry Division during the past year continued the scheme of soil culture and crop rotation investigations that has now been under way for a period of years on the branch Experimental Farms and Stations. At the Central Farm, Ottawa, the work is limited, due to the shortage of suitable land; nevertheless the results obtained are encouraging.

Special attention is given to the cost of production of field crops on the different Farms and Stations, and observations are made of the influence which labour-saving implements have in this respect.

WEATHER CONDITIONS AND CROP YIELDS, CENTRAL FARM, OTTAWA.

The results in field crops on the Central Farm for the season of 1917 were fairly satisfactory. Seeding commenced on April 28, and was completed May 14. Potatoes and roots were planted towards the middle of May, and corn planting was finished by the end of the month. Growth was slow on account of the cool weather, but improved during the favourable weather in June. The fore part of the haying season was very wet, and operations were delayed considerably; however, the work was completed during the fine weather of the closing week of July. Grain was harvested and threshed during August, and Indian corn was put into the silo during the latter part of September. October was cool and wet with much less sunshine than usual, making fall work tedious. Turnips and mangels were harvested during the month. Fall ploughing was finished early in November, and some underdraining was completed.

YIELD of Field Crops, Central Farm, 1917.

Crop.	Area.	Total Yield.				Average Yield per Acre.			
		Tons	Lb.	Bush.	Lb.	Tons	Lb.	Bush.	Lb.
Corn.....	40	662	1,805	.....	.....	16	1,146	.....	.....
Oats.....	40	.....	.....	2,106	16	.....	.....	52	22
Oat straw.....	40	44	1,985	.....	.....	1	250	.....	.....
Hay.....	34	106	1,050	.....	.....	3	267	.....	.....

COST OF PRODUCTION OF FIELD CROPS.

The accompanying data of the cost of production of field crops are determined from fixed values used from year to year, regardless of fluctuations in labour and market prices.

Cost of Production of Field Crops, Central Farm, 1917.

Crop.	Area.	Yield per Acre.		Cost to Produce.		
				Per Acre.	Per Ton.	Per Bush.
	Acres.	Tons	Bush.	\$ cts.	\$ cts.	cts.
Corn	40	16.57	.....	28.24	1.70	.....
Oats	40	.....	52.67	16.83	.....	26
Oat straw.....	40	1.12	.....	16.83	3.01	.....
Hay.....	34	3.13	.....	20.14	6.43	.....

ROTATION OF CROPS.

For various purposes, fifteen rotations are under way at the Central Farm. From these tests important conclusions and data have already been drawn. The rotations conducted under regular farm conditions are as follow:—

Rotation “A” (five years’ duration).—Hoed crop, manured; grain seeded down with clovers and grass; clover hay, top-dressed with manure in autumn; timothy hay, field ploughed in August, top-worked and ribbed up in October; grain seeded down with red clover to be ploughed under the following spring, when the succeeding hoed crop is corn.

Rotation “B” (five years’ duration).—Hoed crop, manured; grain, seeded down with clovers and grass, top-dressed with manure in autumn; clover hay, ploughed in autumn; grain, seeded down with clovers and grasses; clover hay.

Rotation “C” (four years’ duration).—Hoed crop, manured, grain seeded down with clovers and grass; clover hay; timothy hay, field ploughed in August, top-worked and ribbed up in October.

Rotation “D” (three years’ duration).—Hoed crop, manured; grain, seeded down with clovers and grass; clover hay.

Soiling Crop Rotation “R” (three years’ duration).—Corn for early fall feed, manured; peas and oats to cut green, seeded down with clovers and grass; clover hay to cut green.

The records for the past year from the rotations outlined in the foregoing are given herewith.

COSTS, RETURNS AND NET PROFITS FROM ROTATIONS “A”, “B”, “C”, “D” AND “R”, 1917.

Rotations.	Cost to operate per acre.	Value of return per acre.	Profit per acre.
	\$ cts.	\$ cts.	\$ cts.
A (five years’ duration).....	18.89	23.74	4.85
B (five years’ duration).....	18.85	20.28	1.43
C (four years’ duration).....	18.76	21.40	2.64
D (three years’ duration).....	20.93	26.29	5.36
R (three years’ duration).....	21.24	26.97	5.73

CULTURAL INVESTIGATIONS.

The following cultural investigations are being conducted at the Central Farm, Ottawa:—

Shallow ploughing and subsoiling versus deep ploughing.—For this experiment two four-year rotations are used, differing only in the preparation of the sod areas for roots or corn as indicated in the foregoing heading. The results, as in the past, fail to show any decided advantage in favour of either method.

Commercial Fertilizer as a part substitute for barnyard manure.—Four four-year rotations are used in this experiment which is designed to supply information regarding the fertilizer merits of:

- (1) No manure or fertilizer but pastured one year in four.
- (2) Barnyard manure.
- (3) Complete commercial fertilizer.
- (4) Barnyard manure and commercial fertilizer.

SESSIONAL PAPER No. 16

Rotation and Cultural Experiments on the Branch Experimental Farms and Stations.—Besides the investigations under way at Ottawa, crop rotations and soil cultural experiments have received attention on several of the branch Farms and Stations for a period of years. A good rotation for the eastern provinces has been found to include (1) roots, corn or other cultivated crop; (2) some cereal crop; (3) meadow or pasture. Various combinations of these three groups are possible. Certain combinations are likely to give good results under conditions as they exist in the eastern provinces. Certain other combinations of these groups, with possibly the inclusion of a summer-fallow year in the course, are likely to prove satisfactory under climatic conditions as they exist in the prairie provinces.

The soil cultural problems that have proved difficult to solve in the prairie provinces are those having to do with prairie breaking, preparing land for crops, moisture conservation, forage crop production, conservation or increase of soil fertility and weed eradication. With a view to giving information as to methods of cultivation likely to give best results along the foregoing lines a number of experiments are under way at Brandon, Indian Head, Rosthern, Scott, Lacombe, and Lethbridge. In the east at Charlottetown, P.E.I., work of a similar nature has been started.

Several years' data will likely be required of both rotation and cultural work before definite conclusions can be drawn. More detailed observations on this work will be found in the summary reports from the branches.

DIVISION OF ANIMAL HUSBANDRY.**REPORT OF THE DOMINION ANIMAL HUSBANDMAN****E. S. ARCHIBALD. B.A., B.S.A.**

At the Central Experimental Farm, Ottawa, the live-stock work has progressed quite satisfactorily during the past year. The conditions as to housing, feeding, and general management of the stock were excellent. The abundant supply of ensilage, green feed, and hay, and the excellence of the pastures, maintained production and the growth of the young stock in spite of the great scarcity and the high prices of grains and meals. However, the pasture areas are still too limited for most economical production and for most progressive work, especially in the case of sheep and swine.

There are now 635 head of live stock in the stables, made up as follows: 188 dairy cattle, 32 horses, 199 sheep, and 216 swine. All the live-stock have made a fairly good showing during the past year. The amount of experimental work was most satisfactory, though somewhat curtailed by war conditions. The sales of dairy products amounted to \$11,371.41; of dairy cattle, \$5,587.00; of beef cattle, \$7,426.58; of sheep, mutton, and wool, \$1,462.50; and of swine for pork and breeding purposes, \$6,617.31. These sales, coupled with the increased values of the various herds and flocks, the value of manure at only \$1 per ton, the horse labour supplied other Divisions at only 70 cents per day, makes a sum total of \$50,703.85, an increase of \$6,498.98 over the past year.

HORSES.

The horses do all the labour connected with the various Divisions of this Farm. At present there are thirty-two head, which include twenty-five draught horses and draught colts, four expressers and three drivers. The heavy draught horses include four imported Clydesdale mares and several grade Clydesdale mares. All the horses are in excellent condition. Breeding operations with horses have been satisfactory during the year, and the crop of excellent colt foals is making substantial progress.

9 GEORGE V, A. 1919

Experimental work along the lines of feeding, care, and management of mares and young stock, the values of vaccines as prevention of Joint Ill, all gave most promising results.

The horses have increased in value during the past year by \$1,385. The horse labour supplied amounted to 7,660.5 days which, at the very low valuation of 70 cents per day, gives a total return of \$5,362.35. Even with these low valuations of labour and manure, and in spite of very high feed values, this department showed a balance sufficient to offset labour, feed, shoeing, harness and repairs, and purchases.

BEEF CATTLE.

Owing to the lack of suitable buildings and of pastures, no breeding beef cattle are maintained on this Farm.

However during the past winter two carloads of western steers were finished for market. These steers were purchased on the Winnipeg market and shipped to Ottawa during the first week of December, 1917. Upon arrival they were dehorned and housed in a very cheap single-board, single-story shed, which had an open front facing a protected yard in which the feed racks and water troughs were placed. The steers were divided into two groups, separating the heavy and light steers, and the former group was fed more heavily for a quicker finish. In spite of the exceedingly cold winter, all steers remained very healthy throughout the entire feeding period of 116 days. Group I (heavy steers) made 1.93 pounds daily gain per steer, and a profit over feed of \$5.68 per steer. Group II (lighter steers) made 1.75 pounds daily gain per steer and a profit over feed of \$5.11 per steer.

Considering the very high prices of feeds, these are fair profits. No extra labour was required for this feeding, as the regular hands of the stables did all feeding, which was quickly performed by hauling feeds once daily with horses direct from mows and silos.

These steers sold on the Montreal markets at \$12 to \$13 per hundredweight, which was the top price at that time. Although only a small cash profit was realized on this investment when considering initial cost, freight, labour, feeds, bedding and interest on investment, yet there remain over 250 tons of excellent manure which may be conservatively valued at \$2 per ton.

DAIRY CATTLE.

Four pure-bred and two grade herds are maintained, namely: Ayrshire, 57 head; French Canadian, 27 head; Holstein, 43 head; Jersey, 27 head; Grade Ayrshire, 15 head; and Grade Holstein, 19 head. This total of 188 head of dairy cattle of all breeds and ages is an increase of 34 over March 31, 1917. A most unexplainable outbreak of tuberculosis amongst these herds during the past year was responsible for the loss of several good animals, and consequent diminished returns. However, in spite of this, gross receipts from the dairy herds were very heavy.

Dairy cattle experiments.—Much of the experimental work with dairy cattle was temporarily discontinued owing to war conditions. However, the following lines of work have been maintained, and in some cases extended. In a study of feeds and feeding, four lines of work were continued, namely, (1) study of pasture supplements; (2) comparison of meals available on Canadian markets; (3) quantities of meals which may be profitably fed to dry cows and cows in milk; (4) costs of rearing young stock with milk and various milk substitutes. This latter work has been so satisfactorily conducted as to reach some definite conclusions, and the results thereof will be available in bulletin form in the near future.

Co-operative milk record forms have been distributed in larger numbers than heretofore, which evidences greater interest amongst dairy farmers in greater production and increasing profits.

The continued study of all the various makes of milking machine has been most satisfactory, and this work is now being summarized for a separate publication. It is of

SESSIONAL PAPER No. 16

interest to note that one machine, "Hinman," was added to this equipment during the year, and to date has given excellent results in every way.

Many different fly sprays and poisons were used comparatively during the past year, the majority of which were quite satisfactory.

The careful study of contagious abortion in cattle was continued. The work with serums and vaccines as a preventative to abortion was continued by the Health of Animals Branch, and satisfactory results obtained.

Dairy cow returns.—Although the following table shows a lower production and profit over feed per cow, yet this is scarcely a fair basis for judging the status of the herd, as many of the best cows of all breeds had not completed their lactation periods during the year, and of those which did finish, a large number were heifers. Again, feed prices were so very high that the relative profits were lower in spite of increased values of milk and butter.

AVERAGES.

No. of head.	Breed.	Age.	Average days in milk.	Average pounds milk produced.	Average per cent fat in milk.	Average profit over cost of feed between calvings. Labour, manure, and calf, etc., not included.
55.....	All breeds and grade	5	325	8,065	4.10	95.18
5 best.....	Ayrshires.....	8	306	8,940	4.01	109.30
14 total herd.....	.....	6	312	7,324	3.83	82.42
5 best.....	Canadians.....	6	316	7,738	4.78	110.33
5 total herd.....	.....	6	316	7,738	4.78	110.33
5 best.....	Holsteins.....	6	383	13,103	3.61	140.75
15 total herd.....	.....	5	345	9,857	3.68	110.97
5 best.....	Jerseys.....	3	343	6,618	5.34	110.57
9 total herd.....	.....	3	305	5,374	5.28	86.22
4 best ¹	Grade.....	6	332	5,590	4.15	78.73
4 total herd.....	Ayrshires.....	6	332	5,590	4.15	78.73
5 best.....	Grade.....	7	343	10,892	3.88	131.44
8 total herd.....	Holsteins.....	5	348	9,773	3.86	113.25

¹ Only four head in grade Ayrshires.

Official records.—In spite of labour and feed shortage, a few cows were again entered in official records and, although working under very average commercial conditions, made the following very creditable records:—

CANADIAN record of performance, April 1, 1917, to March 31, 1918.

Name and number of cow.	Breed.	Age at commencement of test.	Number of days milking.	Pounds of milk produced.	Pounds of fat produced.	Average per cent fat.
Flavia 3rd of Ottawa..28100	Ayrshire....	8 years	328	10,880	408	3.75
Aromaz..... 1597	Fr. Canadian.....	8 "	365	13,219	631	4.77
Evergreen, March 3rd.12658	Holstein....	6 "	329	14,570	489	3.35
Ottawa Bessie Ann....27130	"	3 "	365	10,891	400	3.67
Rhoda 2nd's Maud.... 7314	"	10 "	359	11,794	379	3.21

9 GEORGE V, A. 1919

CANADIAN-HOLSTEIN-FRIESIAN record of merit, April 1, 1917, to March 31, 1918.

Name and number of cow.	Age at com- mencement of test.	Number of days in test.	Pounds of milk produced.	Pounds of fat produced.	Pounds 80% butter produced.
Butter Boy Keyes 2nd Lass....19686	6 y., 10 m., 0 d.	7	447	18.47	23.09
Butter Boy Keyes 2nd Lass....19686	6 y., 10 m., 0 d.	14	975	36.62	44.52
Canaan Beauty, 2nd.....21172	5 y., 2 m., 25 d.	7	559	16.13	20.17
Canaan Beauty 2nd.....21172	5 y., 2 m., 25 d.	30	2,292	62.71	78.39
Evergreen March 3rd.....12659	7 y., 11 m., 7 d.	7	504.5	16.94	21.17
Evergreen March 3rd.....12659	7 y., 11 m., 7 d.	30	2,131	68.14	85.17
Helena Keyes Posch.....21376	5 y., 6 m., 24 d.	7	689	18.55	23.19
Helena Keyes Posch.....21376	5 y., 6 m., 24 d.	14	1,335.5	36.70	45.87
Lulu Ormsby.....27288	4 y., 4 m., 11 d.	7	433	17.80	22.25
Lulu Ormsby.....27288	4 y., 4 m., 11 d.	30	1,857.5	67.00	83.75
May Echo Posch.....36074	4 y., 11 m., 0 d.	7	611.5	21.43	26.79
May Echo Posch.....36074	4 y., 11 m., 0 d.	30	2,542	85.10	106.38
Ottawa Bessie Ann.....27130	4 y., 5 m., 11 d.	7	536.5	18.54	23.17
Ottawa Bessie Ann.....27130	4 y., 5 m., 11 d.	30	2,202	73.12	91.40

SHEEP.

Although the lack of pasture is still a great hindrance in the investigational work with sheep, yet conditions have improved materially through the loan of grazing lands in the arboretum for which this Division is indebted to the Division of Botany. Breeding work with Shropshires and Leicesters has been continued most satisfactorily. The flocks have again increased in numbers and value, and there are now 199 head in the pens. Allowing full values on labour, feeds, purchases, and interest on investment, the sheep on this Farm have produced a net profit of \$937 during the year.

No lines of experimental work were undertaken, aside from acquiring correct figures as to costs of rearing young stock and profits therefrom.

SWINE.

Another very successful year is to be reported for this department on this Farm. At present there are 216 head in the pens, composed of 158 Yorkshires and 58 Berkshires. This is an increase of 28 head over March 31, 1917. The quality also of both breeds has very materially improved during the year. Including sales \$6,617.31, increased value of herds \$2,411, and manure at only \$1 per ton, this department shows a profit of \$1,913.92 over feed, regular labour, extra labour for experiments and purchases.

Several lines of investigational work have been conducted; all, however, dealing with the possibility of increasing production with the limited feeds and labour available. These experiments were conducted under both winter and summer conditions.

Experiment No. 1, conducted to obtain information as to rations for weaning pigs, again showed skim-milk unexcelled as a supplement to a shorts, oats and corn ration. Tankage and fishmeal, although slightly inferior to, were excellent substitutes for, skim-milk.

Experiment No. 2, dealing with methods of feeding young pigs, showed greatest gains from the free use of the self-feeder in the creep from the age of four weeks.

Experiment No. 3, dealing with the value of clover pasture for growing hogs, showed the pasture for this year of a value sufficient to reduce the cost of production nearly 20 per cent as compared with a similar lot given the same feeds on dry lot. Gains on pasture were very rapid. This experiment also demonstrated the value of the self-feeder for hogs. Not only was over 50 per cent labour saved, but gains were made more rapidly, and the feeds consumed per pound of gain were only slightly greater.

Experiment No. 4 was a study of available feeds which might be used as substitutes for feeds such as middlings, barley, corn, etc., which owing to war or crop conditions, were off the market for the time being. This experiment dealt largely with the value of grade A elevator screenings (buckwheat screenings) as fed with some standard meals. Briefly, the findings of this trial are as follow:—

SESSIONAL PAPER No. 16

Buckwheat screenings and skim-milk fed to shoats weighing about 70 pounds produced the greatest gains per day, and the pigs were in better bloom and health than other lots. The gain, however, cost slightly more than some other lots, amounting in feed to 6.35 cents per pound.

Shorts and skim-milk produced the next largest gains per day and second greatest gains for meal consumed, and gains cost in feed only 5 cents per pound. However, the lack of bloom and the tendency toward crippling were evident, and pigs were not as marketable as any other lot.

Screenings and shorts, equal parts, with skim-milk stood fourth as to total gains, and third as to cheapest of gains, which cost in feed only 6 cents per pound. In this lot there was some tendency to crippling, but not as great as with those fed on shorts alone.

Screenings, linseed oil meal, and skim-milk produced 0.82 pound gain per pig per day, which cost in feed 5.65 cents per pound gain. This feed showed the greatest gain for meal consumed, but stood below shorts as to cheapness. However, the pigs were in good shape and showed no disposition to cripple.

Screenings, tarrage, and skim-milk showed less total gains, less gain for meal consumed and higher cost of production than where linseed oil meal was used. The thrift of the pigs, too, was not as good.

A mixture of barley, shorts, linseed oil meal, and skim-milk was less successful than any preceding feed in producing gains or profit.

This experiment clearly illustrates the excellence of elevator screenings as a feed for finishing hogs.

Exact information relative to the costs of breeding and rearing pigs has been obtained during the year. Results have shown that, even with present high labour and feed prices and high cost of breeding stock, there is yet a fair margin of profit in rearing pork.

BRANCH FARMS.

The writer, in addition to his duties at the Central Experimental Farm, has officially visited, at least once during the year, all the branch Farms and Stations in Canada where live-stock work is conducted or expected in the near future. It is the aim to assist the superintendents of these Farms to establish necessary herds and flocks and to organize and develop live-stock work in every way possible, so as to meet the immediate needs of Canadian farmers.

BUILDING PLANS.

The Animal Husbandry Division has again during the fiscal year furnished plans and specifications of proposed new live-stock buildings for branch Farms. Several of these plans, approved by the Director of Experimental Farms, have been used by the Department of Public Works in the construction of these buildings.

A large number, over 500, of plans and specifications of farm buildings have been sent free of charge to farmers throughout Canada, and many excellent barns have been constructed after these plans to the marked satisfaction of their owner.

MISCELLANEOUS.

The correspondence and other office work of this Division continue to make rapid growth.

The writer, as well as the staff of assistants, has spent a great deal of time attending a large number of meetings in various parts of Canada and assisting farmers to maintain and, where possible, increase animal production.

The duties of judging at numerous exhibitions, assisting at live-stock short courses, including the Ontario Judges' Course held on this Farm, and the studying of live-stock conditions and the needs for experimental and demonstrational work have received most careful attention.

DIVISION OF HORTICULTURE.

REPORT OF THE DOMINION HORTICULTURIST, W. T. MACOUN.

FRUITS.

While the fruit crop in 1917 was not as satisfactory at the Central Experimental Farm as in 1916, a fair crop of most kinds of fruit grown was harvested.

Although the apple scab was not as bad in this district as in the previous years, it would have done much injury at the Experimental Farm if the trees had not been kept thoroughly sprayed, but as a result of spraying there was little scab on the fruit as a whole.

It was a favourable season for European plums, and good crops of a number of varieties were gathered. Owing to the late season and cool autumn, few varieties of grapes ripened. Small fruits did well. It was a good season for most kinds of vegetables. The ornamental grounds were particularly attractive in 1917.

Apples.—There is at the Central Experimental Farm one of the best collections of varieties of apples in America, and certainly the best collection of the hardiest varieties. It is necessary to have such a collection at some place in Canada as fruit growers are constantly wanting varieties named. They are obliged to put the correct name of the variety on every closed package for export, and there must be some place where they can have varieties identified if they do not know them, and to be familiar with varieties one must see them frequently; hence the Horticultural Division is looked to for this information. Many samples were sent in for name in 1917. Detailed descriptions are made of the varieties which fruit at Ottawa, and those which cannot be grown there on account of being too tender are named from specimens obtained from other sources. Many new varieties fruit every year, both of those originated at Ottawa and elsewhere, and 1917 was no exception. Mention has been made from year to year of the new varieties originated in the Horticultural Division. A collection of these was shown at the Exhibition of the American Pomological Society held in Boston in October, 1917, and was awarded a Silver Wilder Medal, the highest award given by this society.

Plums.—Fruit growers in the colder parts of Canada, where European plums cannot be grown, are urged to grow the improved varieties of American plum, which are very hardy in fruit bud. Among the earliest and best varieties of these are the Cheney, Assiniboine and Mammoth, which, though suitable wherever these plums are grown, are particularly desirable for the districts where the season is short. Other good varieties, which need a longer season, are Brackett, Bixby, Admiral Schley, Surprise, and Terry. Two good, hardy, hybrid varieties are Emerald and Omaha.

Pears.—There are a few hardy and blight-resistant varieties of pear at Ottawa, such as the Kurskaya, Bessemianka, and Zuckerbirne, but these are all inferior in quality. Crossing was continued in 1917 between these and some of those of good quality, with the object of obtaining better sorts than those now available. A fine lot of young trees as a result of the work of previous years will be ready to plant out in 1918.

Cherries.—The ordinary sour cherries, even those of Russian origin, are not satisfactory at Ottawa, but a dwarf species from Northern Japan and Northern China called *Prunus tomentosa* gives promise of extending the area for cherries considerably northward. The fruit varies much in size, but is of good quality. Many seedlings are being grown for the purpose of obtaining, if possible, still larger fruit. These cherries fruited well in 1917.

SESSIONAL PAPER No. 16

Grapes.—Few varieties of grapes ripened in 1917 on account of the cool autumn, but it has been found that there are a few sorts of the European grape which are earlier in cool seasons than any of those of American origin. The names of two which are particularly early are Pearl of Csaba and Bonne Madame.

Currants.—The black currants originated by the late Dr. Wm. Saunders continue to be the most productive varieties grown. Some of the best of these are Climax, Kerry, Clipper, Magnus, and Saunders.

Raspberries.—The Herbert raspberry has done better than any other at Ottawa; Cuthbert, the standard sort in the warmer parts of Canada, not being so hardy. A promising new sort is the Newman No. 23, originated by C. P. Newman, Highlands, Que.

Gooseberries.—While the English gooseberries do well in some private gardens in Ontario, when grown in the open they are very subject to mildew, and although many sorts have been tested at the Experimental Farm, none has proved entirely satisfactory, even with spraying. The chief dependence is still on Downing, Pearl and Josselyn or Red Jacket. Oregon Champion does well in some districts, particularly in British Columbia, and should be tried. Houghton is the most satisfactory for the prairies.

Strawberries.—Such a large number of persons in Canada are interested in strawberries that they have always been a prominent feature of the horticultural work. Experiments in methods of cultivation have been tried, but the matted row system has been found the most satisfactory for the colder parts of Canada. There is usually more or less winter-killing, but, as a rule, there are enough plants left in the matted row system to ensure a fair to good crop. The varieties which have succeeded best at Ottawa over a long period are:

Early: Bederwood, per.; Splendid, per.

Medium Early: Greenville, imp.; Pocomoke, per.; Senator Dunlap, per.

Medium to Late: Parson Beauty, per.; Buster, imp.; Sample, imp.; Glen Mary, per.

Wm. Belt is a good late variety for home use, and Senator Dunlap is one of the hardiest and most satisfactory on the prairies. Progressive has proved to be the most satisfactory "everbearing" variety at Ottawa. Two very promising sorts originated at the Central Farm are Portia and Valeria, both especially suited for the home garden.

VEGETABLES.

In 1917 especial attention was again paid to experiments in growing vegetable seeds. Beets, carrots, parsnips, cabbage and celery were successfully wintered outside, as in 1916, and the yield of seed was good. From plants grown on small areas the following yields of seed per plant have been obtained: Beets $2\frac{1}{2}$ to $5\frac{1}{2}$ oz., cabbage 2 to 5 oz., carrots $1\frac{1}{2}$ to $2\frac{1}{2}$ oz., celery 1 to $2\frac{1}{2}$ oz., onions $\frac{1}{4}$ to $\frac{1}{2}$ oz., parsnip 2 to 4 oz.; and the yield per plant of some of the annual vegetables not usually grown from seed are: lettuce $\frac{1}{4}$ oz. per plant; radish 1 oz. per plant; spinach $1\frac{3}{4}$ oz. per plant. It is planned to grow larger areas in 1918 on most of the Experimental Farms and Stations, and the yield from those will give a better idea of what yield per acre might be expected when grown on a commercial scale. It has been found by experience that home-grown seed is quite as good or better than that grown in other countries. In view of the possible shortage of seed of some kinds of vegetables in 1919, and because of the ease with which the private individual can grow enough seed for his own use, a circular was published in the winter of 1917-18 entitled, "Every Gardener His Own Seed Grower," in which those who had roots in their cellar were urged to save a few of each kind of vegetable and plant them in the spring of 1918. Directions were given for growing the plants and saving the seed.

9 GEORGE V, A. 1919

The great superiority of seed potatoes from the parts of Canada having relatively cool summers was again shown in a comparison at Ottawa of seed stocks from different districts. The total yield per acre of Green Mountain potatoes from seed from Port Arthur, Ont., was 400 bushels 24 pounds per acre; from Fredericton, N.B., 341 bushels per acre; and from Ottawa seed 85 bushels 48 pounds per acre. The advantage of early planting in eastern Ontario was again shown. Green Mountain potatoes planted on May 12, 1917, yielded at the rate of 352 bushels per acre, and on May 26, about the date they are commonly planted, 295 bushels per acre. The desirability of sprouting potatoes in the light for several weeks before planting was shown by the yield obtained. Irish Cobbler, sprouted, yielded at the rate of 227 bushels per acre, and unsprouted, 164 bushels per acre. Crines Lightning, sprouted, yielded at the rate of 563 bushels per acre; and unsprouted, 354 bushels per acre. While the latter variety outyielded the Irish Cobbler, it was due mainly to the superior vitality of the seed of the Crines Lightning, rather than to the variety itself.

As there was great interest shown in 1917 in a newspaper article describing the very large yields said to have been obtained by growing potatoes in crates or pens, this method was tried at Ottawa, but the yields were very disappointing. From a crate 8 x 6 x 6 feet in size a crop of 81 pounds 4 ounces of marketable, and 12 pounds 4 ounces of unmarketable potatoes was harvested. The amount of seed used was 42 pounds marketable potatoes.

The development of earlier and better strains of different kinds of vegetables is an important feature of the work of the Horticultural Division. The Alacrity tomato and Early Malcolm corn are now in the trade, and are eagerly sought for. The Squaw corn, which is especially early, has been crossed with varieties of sweet corn, and promising new sorts have been obtained and are being selected. Attention is being paid to the improvement of beans, peas, onions, and other vegetables, and work in selecting new strains of tomatoes was continued in 1917.

Flowers.—Notwithstanding the war, it has been felt that some flowers should be grown, and during the season of 1917 there was a good display of annuals, especial attention being given to asters and sweet peas, which are two of the most popular flowers. The rose garden looked well, and attracted many visitors. Very fine strains of columbine are being developed by selection and cross-breeding, and these bloomed profusely. In the greenhouses the new varieties of geraniums originated at the Experimental Farm attracted much attention, while the chrysanthemums drew crowds of people.

Vegetables in Greenhouses.—Special attention was paid to vegetables in the greenhouses in 1917, experiments being tried with beans, cucumbers, tomatoes, melons, and lettuce. It had been found in 1916 that the Hodson Wax bean became a climbing bean when given wire support. Hence in August, 1917, a whole house was planted to this variety and a wire trellis put up for the plants to climb on, with the result that they grew to a height of 5 feet, of which 3½ feet bore beans. There was about two and one-half times the crop from the Hodson Wax grown on the trellis as when it was grown without. A test of Hodson Wax and other dwarf varieties was made during the winter months, the seed being sown on December 13, 1917, to determine if other sorts would climb, but they did not to any extent, although they gave indications that they might if grown at a more favourable season. Hodson Wax only reached a height of 29 inches in this test. The heaviest yielding varieties were Masterpiece, May Queen, Plentiful French, Sutton Plentiful, Dwarf French Excelsior, Long Pod Forcer, all of which yielded nearly the same and most of which were very similar in appearance.

A crop of head lettuce was grown very successfully in one of the greenhouses during the winter of 1917-18. Twenty-three varieties and strains were compared. The most promising were Sutton Golden Ball, Veitch Golden Queen, very similar to the last, Sutton Earliest of All and Early Paris Market. The Boston Market and others

SESSIONAL PAPER No. 16

very similar, while succeeding well, were longer in developing, and in a cold climate where considerable fuel is necessary to keep the houses even at the low temperature required for lettuce, it is important to have the crop mature as soon as possible.

CANNING EXPERIMENTS AND DEMONSTRATIONS.

As the canning of fruits and vegetables is a very important occupation during war-time, a special effort was made to assist housewives in this work, and to encourage those to can produce who had not done so before. Hence a young lady trained in domestic science was employed for several months to experiment in methods of canning and to try different canning outfits. The work was very successfully done, and a number of demonstrations in canning were held which were attended by many people. Demonstrations were carried on at the Central Canada Fair, where very many watched the operations. A pamphlet on canning was prepared for the Food Controller's office by the Horticultural Division, and was widely distributed.

The correspondence during the year was particularly heavy, as very many people throughout Canada have become interested in horticulture since the war began. Much information was given to these people by letter and thousands of bulletins, pamphlets and circulars were distributed. Owing to the great interest in regard to potatoes, an exhaustive bulletin on this crop was published during this year, giving the results of experiments. A popular edition of this was also issued.

THE CEREAL DIVISION.

REPORT OF THE DOMINION CEREALIST, CHAS. E. SAUNDERS, B.A., Ph.D.

THE SEASON.

The spring of 1917 throughout large sections of Canada was remarkable for the unusual lateness of seeding. In the West, seeding did not become general until the first week in May. In northern and central Ontario, and in most parts of Quebec, little was done before the 10th of May, while in the Maritime Provinces, and especially in New Brunswick, operations were delayed until the middle or towards the end of the month. Had it not been for unusually favourable weather conditions immediately following this period, the late seeding, more particularly in the West, might have been disastrous. During the growing season, there was a long period of severe drought over the larger part of Alberta and Saskatchewan. Manitoba was considerably less affected. In Eastern Canada, June was a particularly cool month, and growth was slow. Some of the late-sown grain was injured.

These various unfortunate conditions reduced the yields of cereals in all the provinces. In quality, however, the grain compared favourably with previous seasons, wheat in particular being of unusually high grade. Barley was of medium quality but oats suffered a good deal from various untoward seasonal conditions.

NEW VARIETIES OF CEREALS.

Two new cross-bred varieties of cereals from among the very large number under test at Ottawa, have been named and introduced this past winter. One of these is an early ripening spring wheat, and the other an early ripening hullless oat.

The new wheat, which has been named Ruby, Ottawa 623, was formerly recorded as 623B. It is a selection made from the progeny of a cross between Downy Riga and Red Fife. This cross was effected by the Dominion Cerealists in the year 1905, a selected strain of Downy Riga (Downy Riga G) and a selected strain of Red Fife

9 GEORGE V, A. 1919

(Red Fife II, since named Red Fife, Ottawa 17) being employed. Downy Riga was produced many years ago at the Central Experimental Farm by crossing two early sorts: Gehun, an Indian variety of extremely early ripening habit, and Onega, a wheat from Northern Russia. The following are the striking characteristics of Ruby wheat: it ripens a week or more, as a rule, before Marquis, and a few days after Prelude. The kernels are somewhat similar to those of Red Fife, being hard and of the popular reddish-brown colour. The heads are beardless. The straw, in most localities, is rather shorter than Marquis, but of good strength. It is not expected that Ruby will resist wind quite as well as Marquis, but, on the other hand, it will be easier to thresh. Ruby produces flour of excellent colour and high baking strength. As for yield, the experiments which have thus far been carried on indicate that Ruby will stand in yield as it does in earliness; between Prelude and Marquis. Prelude yields approximately seven-eighths as much as Marquis, under conditions favourable to the latter, and Ruby may be expected to do distinctly better than this. It is not, however, recommended as a substitute for Marquis in those districts where Marquis is quite satisfactory, but, for localities where Marquis cannot be depended on to ripen in good time, Ruby is confidently recommended as the best extra-early wheat known at present. A limited, special distribution of this wheat has been carried on this spring, and arrangements have been made for a larger distribution next season.

The new oat has been named "Liberty, Ottawa 480". Its previous designation was 480 L. This is a selection made from among the progeny of a cross effected by the Dominion Cerealists in the year 1903 between the Chinese Naked variety and the Swedish Select. Liberty is decidedly early in ripening, and stands up exceptionally well. It yields (so far as can be definitely stated from the figures available) about seven-eighths as much as Banner, when allowance is made for the hull of the latter. Obviously, this new oat is not recommended as a variety to take the place of the standard sorts which retain their hull. It will, however, be of very great value for certain special uses. As it gives up its hull in the threshing machine, it should occupy a very important position in the feeding of young pigs and young chickens. For household use, especially in outlying districts, it will also be very valuable. By passing the threshed grain once or twice through the fanning mill, a product is obtained pure enough for grinding in any ordinary hand or power mill for household uses. The oatmeal so produced is of exceptionally fine quality, and gives porridge and oat cake superior (in the opinion of almost every one who has tested them) to any of the oat products now on the market. The Liberty oat is strongly recommended to the consideration of farmers in almost all sections of Canada. The Cerealists believe that it would be advantageous for most of them to grow a couple of acres annually of this variety for use on their farms. Only a very small number of samples could be sent out this winter, but it is hoped that next year there will be a considerable quantity for free distribution.

DISTRIBUTION OF SAMPLES OF SEED GRAIN.

The usual annual, free distribution of four-pound and five-pound samples of seed grain has been carried on. At the time of writing, this distribution is not quite finished.

This year, in order to make a more equitable distribution than in the past, a definite number of samples was allotted to each province and, when sufficient applications for those samples had been received, no more were accepted. By the adoption of this plan, it is hoped that the exceptionally good seed which is sent out from here will do more good than in the past, by being more evenly distributed to the whole of Canada. The supply of seed for the distribution this year was furnished by the following Experimental Farms: Indian Head, Sask., Brandon, Man., Cap Rouge, Que., Ste. Anne de la Pocatière, Que., and the Central Experimental Farm at Ottawa.

SESSIONAL PAPER No. 16

TESTS OF VARIETIES OF CEREALS.

On the whole, good results were obtained on the test plots of cereals at nearly all the branch Experimental Farms and Stations as well as at Ottawa. In some instances, exceptionally unfavourable weather conditions reduced the value of the tests, but valuable information was obtained at almost every location. Harvesting conditions were more favourable than usual at Ottawa and the plots were brought in in exceptionally good condition.

GRAIN PLOTS AT OTTAWA.

Owing to the large increase in the number of new cross-bred and selected varieties and strains under test, it was found necessary to reduce the size of the plots from $\frac{1}{60}$ to $\frac{1}{120}$ acre. This change was not made without due consideration and is deeply to be regretted. The land available, however, is so limited that there was no choice between the reduction in size of the plots and the omission of a number of varieties each year, as has been the practice for several years past. The latter method, however, seems of the two the less desirable for meeting the difficulty and, in the future, it is intended to sow every variety every year, no matter how small the plots may have to be. In the regular test plots, there were 302 varieties and strains of wheat, 19 varieties of emmer and spelt, 322 varieties and strains of barley, 17 varieties and strains of flax, 51 of beans, 75 of buckwheat, and 65 of peas.

Of the usual very small plots of unfixed varieties and of varieties and strains in the first stages of propagation, there were as follows: 822 small lots not fixed, 103 strains in small lots for propagation.

The total number of plots of all sizes was 1,776.

MILLING AND BAKING RESEARCHES.

The milling and baking researches were resumed in December on the appointment of a new assistant. The usual tests of the new cross-bred and selected varieties of wheat produced at Ottawa always occupy much of the time, but some attention was also given this winter to investigations dealing with unusual problems in breadmaking which have arisen on account of war conditions. The quality of flour produced from good milling wheat when the percentage of extraction is considerably higher than usual was investigated and it was found that excellent bread could be made when as high as 85 per cent of flour was obtained from the wheat. Mixtures of wheat flour with flour from other cereals were also baked, the results showing that with good, strong wheat flour the addition of 10 per cent or more of foreign flour from any other cereals does not prevent the production of excellent bread. This winter, 105 samples of wheat have been milled, and 200 test loaves have been baked up to the present date.

Tests of the cooking qualities of peas have also been carried on in order to ascertain the suitability for soup-making of the different varieties, as well as to discover, if possible, the influence of climate and soil. These experiments have not proceeded far enough to enable one to draw any definite conclusions. About thirty tests of samples of peas were also made for the Department of Naval Service.

DIVISION OF BOTANY.

REPORT OF THE ACTING DOMINION BOTANIST, J. H. GRISDALE, B. AGR.

The work on the White Pine Blister Rust was carried on in 1917 with a special appropriation under the Destructive Insect and Pest Act in co-operation with the Forestry Department of the province of Ontario.

A short summary is given herewith of several of the more important features of the work carried out during the summer.

Examination of plantations of imported pines scattered throughout the province was carried on. The inspection covered 123 plantations, aggregating some 156,227 trees. The disease was again found on three plantations where it had occurred last year, but the only new infection occurred at Ancona Point near Lindsay.

Considerable attention was given early in the year to the known danger points, in the hope that if the disease was located early in the season it might be stamped out without much labour or expense. As the season advanced, the rust appeared on currants in such a widespread fashion that further attempts at suppression in these localities appeared useless.

The establishment of a neutral zone along the Niagara river was carried out in conjunction with the New York State authorities. In order to prevent the disease from spreading across the international boundary, all wild and cultivated *Ribes* were removed from a strip one mile wide on each side of the river.

During August and September, the inspectors scouted for the currant stage of the rust. An appeal was made to the public schools for assistance. From both sources of information it was found that the rust was present in 38 out of the 43 counties, or in about 120 out of 455 townships in these counties.

The results of this summer's work enable one to see clearly that the disease has now secured such a foothold in the province that further efforts to suppress it would be useless, and that the only hope for the future pine forests lies in local protection wherever this is possible.

As in the province of Ontario, the department, in co-operation with the Forestry Service of the province of Quebec, established the wide prevalence of the disease in Quebec province.

From the general distribution in Eastern Canada of the rust stage on currants, it is evident that certain provincial legislation will become necessary at an early date excluding from shipment to and from certain areas within both provinces all five-leaved pines and certain currant nursery stock.

The usual appropriation under the Destructive Insect and Pest Act enables the Division to conduct an inspection of potato fields and crops, which is carried on with a view to improving the seed supply of this important commodity. By these means it is hoped eventually to combat the considerable depreciation in yield due to such obscure diseases as leaf roll, curly dwarf, and mosaic. None of these diseases can be recognized in the seed itself, whereas it is an easy matter to deal with them in the fields. This work, formerly confined to the Maritime Provinces and Quebec, is now being extended to Ontario, where it has aroused considerable interest.

The preparation of nitro-culture, which was commenced for experimental purposes within the Experimental Farm system, is being continued. The importance of mixed farming in Canada increases the interest in growing leguminous crops, particularly alfalfa, and everything possible is done to encourage the widest use of these useful crops. For this reason, sample cultures were distributed to a limited extent to farmers who experienced difficulties in establishing or, indeed, total failures in raising, these crops. The treatment of these seeds with pure cultures is in many cases as important as the sowing itself, and results of remarkable interest were obtained from their use.

SESSIONAL PAPER No. 16

During the year, 230 cultures of alfalfa, 80 of red clover, 18 of alsike, 156 of peas, and 26 of beans were sent out. All of these were from original isolations, with the exception of the bean cultures, which were courteously placed at the disposal of the Division by Macdonald College, Que.

From the use of pea cultures on land previously never used for peas, the yield was increased two bushels per acre over a crop not treated. Similar reports have been received on red clover and alfalfa. Over one-half of the total number distributed went to the western provinces.

Mr. John Adams, M.A., in charge of economic botany, dealt with the identification of plants, of which every year a considerable number are sent in from all over the Dominion. The usual exchange of seeds collected in the Arboretum and Botanical Gardens at Ottawa was again carried on with a number of similar institutions in other countries. During a collection trip through the West, numerous seeds of western wild plants were collected and are now being raised in Ottawa. The herbarium collection of the Division received certain additions.

Experimental plots were planted with opium poppy, castor oil, and sunflower, and several species of plants recommended for fibre were also tested. In the absence of a Canadian flora, attention is being given to the compilation of a reference list, including all plants occurring wild in Canada. This will materially assist in saving time in the identification of Canadian plants.

The time of another assistant was devoted to the preparation of the manuscript and illustrations for a bulletin on the principal poisonous plants of Canada.

During the year a number of press articles were prepared, as well as several special circulars and pamphlets. Early in the year the manuscript of a bulletin on Black Stem Rust of Wheat to accompany the coloured poster previously published, was prepared, and appeared in print during the summer.

FIELD LABORATORIES.

The following is a brief résumé of the work carried on under the direction of the Division of Botany at the various field laboratories devoted to the study of plant diseases.

St. Catharines, Ont.—The officer stationed at this laboratory was placed in charge of the White Pine Blister Rust work, and considerable time was spent in carrying out the program referred to elsewhere in this report.

Among other investigations may be mentioned a preliminary study of a strawberry root disease, which appears rather widespread. Progress was also made with Peach Heart rot. The investigations into the cause and control of Peach Canker were concluded, and a bulletin was prepared on the subject. An account of the most common tomato diseases was also prepared during the year, which will appear in bulletin form.

During August of 1917, this laboratory assisted, as far as other duties would permit, in making a survey of the potato situation, especially as it related to northern Ontario. This survey disclosed that, in general, Northern Ontario potatoes are somewhat freer from disease than those grown in the southern part of the province, and it is planned by the provincial authorities to use the northern areas as a source for seed for the rest of Ontario.

A series of sixteen lectures on plant diseases were given throughout the fall and winter, mainly to agricultural classes, farmers' clubs and farmers' institutes, and two weeks were spent with the Better Farming Special in the eastern sections of Ontario in November and December.

Charlottetown, P.E.I.—The principal investigations dealt with at this branch laboratory related to a study of various diseases affecting potatoes, turnips, wheat, beans, apples, cherries, and tomatoes. Potato spraying experiments for Late Blight

established the fact that not less than four applications per season are necessary, though not quite as effective as five or six applications in controlling this disease. Bordeaux mixture composed of 4 pounds of bluestone and 4 pounds of lime to 40 gallons of water appears the most efficient and economical spray to use. Horse-power spraying machines with two or three nozzles to each row, gave more than double the increase in yield that sprayers with one nozzle to each row did. Sprayers with one nozzle to each row gave more than three and one-half times as large an increase when the field was sprayed four times twice over in opposite directions, as when only four single applications were made.

For the control of the Black Leg disease of potatoes, experiments confirmed that the whole tuber should be treated with disinfectants and not the cut tuber. The disease apparently is not carried over in the soil. The study of Curly Dwarf, Leaf Roll, and Mosaic disease of potatoes has been continued. The control of these diseases is still a matter on which considerably more information is required. Arrangements have been made for raising a stock of seed of the turnip variety "Jumbo", resistant to Club Root.

The usual field inspection of potatoes and survey work were carried out. Garnet Chili districts affected with Leaf Roll in Nova Scotia have been thoroughly cleaned up with very satisfactory results. In Prince Edward Island some sections are now going into the business of growing Irish Cobblers for seed as a result of the work of the Division. This should provide a good outlet for potatoes in spring, when prices are always low in that province.

Success attended the efforts to introduce potato spraying. Fourteen horse-power sprayers costing from \$115 to \$150 each were purchased by co-operative spraying clubs in Prince Edward Island and Nova Scotia, and more than 500 acres of potatoes were sprayed for the first time with most satisfactory results.

Fredericton, N.B.—The officer in charge arranged for a series of potato-spraying tests to be carried on to determine the increase in yield due to freedom from blight, the number of applications necessary, and to demonstrate to the farmers in general the value of spraying as one of the essential features in growing potatoes. This work, now carried on for several seasons, appears to have met with gratifying success; the farmers, it is said, now realize that spraying is just as important as thorough cultivation or proper fertilizing of the soil.

An experiment on a large scale aiming at the comparison of yields of potatoes of the same variety but grown at various points, showed that a wide variation existed. This will eventually lead to the elimination of poor-yielding stock as the results become known. The lowest yielding sample of Green Mountain gave 71 bushels per acre, while the highest gave 258 bushels under the same conditions. In some localities there were obtained as many as 348 bushels per acre from this variety. This experiment will show prominently the necessity for a change of seed where poor fields are the rule.

Observations were also made on certain constitutional diseases of the potato, among which are grouped Leaf Roll, Mosaic, Leaf Streak, Spindling Sprout, and Internal Brown Streak.

Brandon and Indian Head Laboratories.—The study of grain rust and other cereal diseases was begun in the spring of 1917, with field laboratories at Brandon and Indian Head. The work during this first summer was largely of the nature of a field survey with the object of gaining information on the origin of the stem rust and the conditions that influence its spread and development. In the early part of the season some time was given to a study of the extent and severity of the epidemic of 1916.

The following principal problems received attention:—

What native and cultivated grasses are attacked and what part do they play in the hibernation and distribution of the rust?

SESSIONAL PAPER No. 16

The species of rusts attacking cereals in Western Canada and the extent of the injury caused by each species.

The origin of the outbreaks of rust—Do the summer spores of the rust live over the winter in straw or stubble of grain fields and attack the growing wheat, or does it survive the winter in the form of mycelium or spores in the perennial grasses and pass from there to wheat, or do epidemics arise from spores carried by the wind from wheat fields further south?

The location of the rust-bearing barberries and their rôle in the spread of rust.

Some time was also devoted to a survey of the extent and injury caused by other cereal diseases.

During the winter, infection experiments were conducted in the greenhouse to determine the strains or biologic forms of the stem rust (*Puccinia graminis*) that occur in Western Canada, and the grasses attacked by these strains.

The rust problem is a wide and difficult one, and needs the co-operation of many investigators. The universities, agricultural colleges, and Experimental Farms generously assisted in many ways during the season, and this assistance is gratefully acknowledged. Plans for close co-operation were outlined at a conference of representatives from these institutions and the Division of Botany, held at Winnipeg in August. It is hoped that these plans will be carried out in the near future. Such co-operation should lead to important results.

DIVISION OF BEES.

REPORT OF THE APIARIST, F. W. L. SLADEN.

For Canada as a whole, the production of honey per colony in 1917 was below the average, although the crop in the important producing region of southern Ontario almost reached the average, and the lower mainland of British Columbia welcomed a good season after two poor seasons. The price of extracted honey rose rapidly during the latter part of the summer, and the rise continued after most of the crop had left the hands of the producers.

Bees were kept at sixteen of the Experimental Farms during the year. The following table gives a summary of the average production of each apiary since the year 1913:—

Farm.	Period.	Average Annual Weight of Honey, produced, per colony, Spring Count.	Value of Production per Colony, Honey and Bees, after deducting Winter Loss.
Charlottetown, P.E.I.....	5 years, 1913-17	23.1 lbs.	\$ 1 51
Nappan, N.S.....	5 years, 1913-17	102.2 lbs.	13 41
Kentville, N.S.....	4 years, 1914-17	49.1 lbs.	6 80
Fredericton, N.B.....	4 years, 1914-17	45.5 lbs.	7 33
Ste. Anne, Que.....	4 years, 1913-16	62.5 lbs.	11 44
Cap Rouge, Que.....	5 years, 1913-17	56.8 lbs.	8 02
Ottawa, Ont.....	5 years, 1913-17	106.7 lbs.	14 76
Brandon, Man.....	5 years, 1913-17	25.7 lbs.	6 28
Morden, Man.....	1 year, 1917	28.0 lbs.	6 90
Indian Head, Sask.....	3 years, 1915-17	39.8 lbs.	11 33
Lethbridge, Alta.....	3 years, 1914-16	86.6 lbs.	18 31
Lacombe, Alta.....	3 years, 1915-17	41.8 lbs.	8 37
Invermere, B.C.....	4 years, 1914-17	58.4 lbs.	9 31
Summerland, B.C.....	2 years, 1916-17	44.5 lbs.	9 38
Agassiz, B.C.....	4 years, 1914-17	33.5 lbs.	4 58
Sidney, B.C.....	4 years, 1914-17	21.8 lbs.	3 00

9 GEORGE V, A. 1919

Alsike and white clover were the principal sources of honey at all the Farms except Lethbridge, where it came from alfalfa, which also gave much of the yield at Summerland.

The value of these figures as a guide to what may be expected in the surrounding country is affected by the following factors. At Ottawa the yield was increased by white sweet clover growing in vacant lots, and at Indian Head by hedges of *Caragana* that are extensively planted at this Farm. At Cap Rouge, Agassiz, and Sidney the nearness of large areas of river, mountain and sea, respectively, reduced the available bee forage. At Brandon, the apiary was used for a while for breeding bees to supply the western Farms. All the apiaries, except Ste. Anne, Ottawa, and Invermere, were in charge of untrained men for a considerable part of the period; Charlottetown was the greatest loser from this cause. The increasing acreage of special crops is gradually making the conditions on many of the larger farms less representative of the regions they serve.

The general conclusion to be drawn from these figures is that bees can be kept with profit in the regions served by all the above Farms, and that Eastern Canada offers better opportunities than the West.

In the summer of 1917, the writer continued his survey of Canada for favourable regions for abundant honey production, visiting, among other places, the Rainy River and Kenora districts in Ontario, and the Lake St. John district in Quebec. The prospects for commercial beekeeping around Dryden in the Kenora district are bright, and the Lake St. John district produces clover honey of the finest quality, the absence of inferior honey being a helpful factor in wintering the bees.

Co-operative experiments with experienced beekeepers in typical localities for honey production were continued and extended. These included East Royalty, P.E.I.; Gaspereau, N.S.; Amherst, N.S.; Louiseville, Que.; Montcerf, Que.; Lytton, Que.; Athens, Ont.; Thornloe, Ont.; Clandeboye, Man.; and Medicine Hat, Alta. All these places, except East Royalty and Athens, were visited by the writer in the summer of 1917. Much valuable information is being obtained from this work.

Experiments with fireweed (*Epilobium angustifolium*), the most promising honey plant for commercial beekeeping at altitudes and latitudes higher than those at which clover gives best results, have been started.

Experiments in importing young bees in spring without combs from the Southern States were conducted at Ottawa. It was found that three 2-pound lots received from Alabama on May 9, about a week before the commencement of the honey flow from dandelion, costing \$3.66 each including express charges, after being supplied with empty combs produced an average of 105.3 pounds of extracted honey, valued at \$15.75, which was about as much as that produced by the regular wintered colonies. Another shipment received on May 27 produced an average of only 18 pounds of honey per lot, which showed the advantage of obtaining the bees at the earlier date.

Experiments having for their object the reduction of labour in the control of swarming, and the reduction in the mortality of bees in the winter, the two greatest problems of bee management in Canada, have been continued. Sealed covers and a northern aspect were again found to produce good results in wintering bees outside, four colonies in a case, in the well protected yard at the Central Farm.

At the Experimental Farm, Ottawa, 2,931 pounds of honey of the usual good quality were obtained from twenty-seven colonies, spring count, an average of 108.5 pounds to the colony, and twelve colonies were sold. The value of honey and bees produced at Ottawa, less sugar fed and colonies lost in winter, was \$14.50 per colony, spring count.

Bees were again placed for the summer on the sandy plain at Kazubazua, Que., and in the vicinity of swamps at Sully, Que., in order to continue the investigation of honey production in similar locations in Eastern Canada and of out-apiary management, more particularly in its relation to the control of swarming. The two

colonies at Kazubazua produced an average of 109 pounds of honey each, and the two at Sully 139 pounds each. The honey was of fair quality, and came from blueberry, pin-cherry, dandelion, raspberry, white clover, alsike, fireweed, and various species of goldenrod. Although abundant room and ventilation were given in the hives, it was found necessary to visit the bees each week from May 24 until August 14 in order to prevent the loss of swarms, queen-cells being found and cut out of one or both of the hives at Kazubazua every week until July 28 and at Sully until August 14.

The growing importance of honey as a food, and the much higher price it now commands, have brought an increased number of inquiries about beekeeping and a heavy demand for the bulletin No. 26 (Second Series), "Bees and How to Keep Them." A number of articles on beekeeping, showing how honey production may be increased, etc., have been prepared and published in the beekeeping and general press.

REPORT OF THE DOMINION AGROSTOLOGIST, M. O. MALTE, P.H.D.

VARIETY TESTS.

The yields of the field-root varieties were, on the whole, low, as is evidenced by their average yields per acre:—

With special reference to the general quality of the field root varieties tested in 1916, it was reported (Experimental Farm Report for the year ending March 31, 1917, page 45) that the variety tests decidedly indicated "that the seed available commercially . . . was generally speaking, somewhat inferior to that of previous years."

The signs of deterioration in the general quality of the field-root varieties, which were observed in 1916, were still more pronounced in this year's variety tests. Practically all varieties secured commercially were greatly lacking in uniformity.

9 GEORGE V, A. 1919

This lack of uniformity, which, of course, signifies degeneration of type and a lowered standard of quality in general, was particularly conspicuous in the mangel varieties. In fact, most of the mangel varieties tested were so badly off type that, in a variety, it was difficult to find even a small percentage of roots that could claim to represent the true type of the real variety in question. This deterioration in type and lack of uniformity in general was also quite apparent in the carrot varieties and, to a less degree, in the swede and the fall turnips.

In view of this, it seems only reasonable to conclude that the figures secured this year for the purpose of determining the yielding capacity per acre of the different varieties are of rather doubtful value. This applies especially to the mangel varieties in which, as pointed out above, the lack of trueness to type was most conspicuous.

FIELD ROOT SEED GROWING.

During the last few years, experiments have been carried out for the purpose of ascertaining the possibilities of raising seed of field roots advantageously in Canada. The experiments, which have been conducted at the Central Experimental Farm at Ottawa and also at various branch Farms and Stations in Eastern Canada and in British Columbia, have, so far, given most gratifying results. Not only have the experiments proved that it is possible to raise heavy crops in the Dominion, but they have also shown that seed, raised in Canada, is at least equal, if not superior, to any seed imported from other countries. That high-class seed of field roots, capable of producing at least as good root crops as any seed imported from foreign countries, can be raised in Canada, has been emphasized in previous reports, but attention may again be called to it in the hope that a realization of the possibilities of providing at home for a seed supply that will make the farmer independent of imports from abroad may stimulate the interest in root seed growing.

Factors Influencing Yields.—During the last three years the Division has conducted some experiments in an endeavour to arrive at definite conclusions as to how cultural methods and soil conditions influence the seed yield. The Division has found, as a result of investigations that however are not yet finished, that the yield of seed per acre is largely determined by two chief factors, viz.:—

1. Time of planting the seed roots in the spring, and
2. State of fertility of the soil.

Experiments conducted in 1915 and 1916 most decidedly indicate that the earlier the seed roots are set out, the heavier are the seed crops realized. Earliest possible planting of the seed roots may therefore safely be recommended. A few degrees of frost, after the roots have been planted, do not in the slightest way injure the seed roots. As a matter of fact, early planting in cool soil is preferable to later planting in soil that is warm, especially when the roots at time of planting are somewhat lacking in crispness.

With regard to the influence of the state of fertility of the land on root-seed crops, some illuminating data have been collected. An experiment, conducted on a rather small scale in 1915, indicated that a heavy application of manure or an application of a complete fertilizer very much increased the yield. The experiment was repeated and somewhat extended this year, different rates and combinations of artificial fertilizers being applied without manure, and also with manure at different rates per acre. The results which, however, are of a preliminary nature, clearly indicate that the land, in order to yield the heaviest possible seed crops, should be heavily manured and, in addition, be given a reasonably liberal dressing of a complete artificial fertilizer.

The Root Seed Supply.—On account of a reported shortage in the field root seed supply, the Division was requested, at the end of June, to take immediate steps to provide for certain quantities of mangel, swede turnip, and carrot seed being raised.

SESSIONAL PAPER No. 16

Accordingly, the necessary acreage for steckling growing was secured, largely by renting of land adjoining Experimental Farms and Stations. On account of the late seeding, and also on account of unfavourable weather conditions during the summer, the steckling crop on the whole did not develop as satisfactorily as it would have done, had the weather been more like normal and the seed sown earlier. The very unfavourable weather conditions that prevailed in Eastern Canada in general during the late fall also made harvesting somewhat difficult and, as a result, the stecklings when put in storage were not in the very best condition for satisfactory wintering.

In connection with the providing of an emergency seed supply, it may be again stated that, ever since the war started, the Division has realized that good seed might become rather scarce should the war continue for any length of time. In order to meet the demand for good seed, in case of serious shortage, the Division has arranged, since 1915, to have available certain quantities of as good seed as possible. For this purpose, improvement work through selection from commercial varieties has been conducted the last few years and, as a result, the Division had available, at the end of the season, considerable quantities of seed of various improved varieties, which may be used to advantage as "stock seed" for seed raising on a large scale.

GRASSES AND CLOVERS.

Breeding.—Unfavourable weather conditions during the plant breeding season, and the necessity of paying special attention to field root seed production as an emergency war measure, caused some curtailment in the breeding work. However, necessary operations for the propagation of the new varieties of timothy, alfalfa, western rye grass, and other forage plants that the Division is developing were carried through, although on a somewhat reduced scale.

Alfalfa, Clover, and Grass Seed Raising.—Most of the seed of leguminous forage plants and grasses produced in Canada is harvested from ordinary hay fields, that is to say from fields seeded down primarily for hay. Under these circumstances, seed growing of the said forage plants is a matter of secondary consideration; whether a given field is to be reserved for hay or for seed will largely depend on whether a hay crop or a seed crop promises to be more remunerative. Growing grasses and clovers exclusively for seed is not practised to any extent in Canada so far.

In order to secure some preliminary data on what cultural methods are likely to favour heaviest seed yields of grasses and clovers, an experiment was started in 1916. Alfalfa, red clover, and timothy were sown broadcast and also in rows about two feet apart. The results, as secured this year, show that in all instances much heavier seed crops were realized with the seed sown in rows two feet apart. Thus, alfalfa sown in rows two feet apart yielded 70 per cent heavier seed crop than when sown broadcast; red clover produced 75 per cent more seed when sown in rows and, in the case of timothy, a 90 per cent heavier seed crop was realized from row seeding. The results thus decidedly speak in favour of row seeding when seed production is aimed at. However, definite conclusions cannot be drawn until more data on the subject have been secured.

THE POULTRY DIVISION.

REPORT OF THE DOMINION POULTRY HUSBANDMAN, F. C. ELFORD.

GENERAL CONDITIONS.

Poultry conditions in Canada during the past year have been more or less unsettled. Owing to the high cost of feed in general, and the impossibility of securing some of the grains usually considered necessary for egg production, many curtailed their operations, while some seriously considered going out of poultry keeping altogether.

9 GEORGE V, A. 1919

For a good part of the year, corn was not available, and wheat, the cheapest feed in Canada this year, and always the best, was being reserved largely for human food. Feed that could be procured was so high in price and of such a poor quality that it was a question with a number of producers whether anything could be made out of poultry even at the comparatively high prices received for the produce.

With a desire to increase production, a larger number than usual of urban flocks were started in the spring. These have assisted in production, though some have not proved as remunerative as was desired or expected. The reason for this lack of profit was mainly because of the age of the pullets. They were, as a rule, too young. Where the pullets were well grown and mature, the results were quite satisfactory, for though all feed was dear, new-laid eggs were never known to be so high.

The experience of this year but emphasizes what the previous two or three years have been teaching. Business principles in poultry keeping must be adopted, the old slipshod methods must be abandoned. Late-hatched pullets do not produce winter eggs. Pullets for winter egg production must be hatched early so as to be matured before winter. Non-producers must be eliminated, and greater efficiency in the flock is the best way to increase production.

THE WORK OF THE DIVISION.

The work of the Poultry Division during the past year has been progressing very satisfactorily, though owing to the lack of accommodation, efforts along several lines of investigation have been considerably curtailed.

The flocks at the various Farms have not been increased, but rather decreased, as the culling of the flocks has been more severe than ever. Labour and feed have been hard to get, and high in price. Of the thirteen Farms keeping poultry, no less than eight of them lost their poultry managers, some because of enlistment, others because of higher wages being paid elsewhere.

Three new Farms were added during the year: Summerland, B.C.; Scott, Sask.; and Lennoxville, Que. One breed only will be kept at Summerland, White Wyandottes; at Scott, Barred Plymouth Rocks; at Lennoxville, the Rocks will also be installed when the stock is obtained this summer. Winter came on before the buildings were completed here, and operations will not commence until next season.

CENTRAL PLANT.

At the Central plant, good results were obtained in the breeding work, and the best crop of young stock that has ever been raised was the result of the season's operations. The pullets went into winter quarters more fully matured and in better shape generally than usual, with the result of an improved winter egg yield.

The pedigree work has advanced to such an extent that for the first time it has been possible to supply all branch Farms with cockerels from high-producing mothers. These cockerels were of an exceptionally good type and constitution, and should do much to improve the laying qualities of next year's pullets. It is expected that from these cockerels the branch Farms will have a considerable number of breeding males to dispose of to farmers next fall.

Owing to increased cost of operation, it was necessary to discontinue practically all of the turkey and waterfowl experiments on the Central plant, just a few breeding stock being retained. At Invermere, B.C., the turkey crop was as large as usual, and investigations there show that so far the ravages of blackhead are not present.

The new pipe brooder house on the Central plant has given satisfactory results. A similar house, but smaller, is being installed at Indian Head, Sask., and at Ste. Anne, Que. The stove brooders have continued to prove satisfactory, and, where large numbers of chicks are being brooded, they are replacing the small hovers.

SESSIONAL PAPER No. 16

EXPERIMENTAL WORK.

Among the lines of experimental work, concerning which more data have been obtained, and upon which greater emphasis is being placed are: The importance of the male in obtaining high egg yield; the value of early pullets for winter egg production; the unprofitableness of late pullets as a business proposition; the value of vigour in the breeding stock; artificial light in the laying pen during the short days; war-time rations; vegetable versus animal protein, etc.

Further experience was gained in feeding buckwheat screenings at the Central Farm and at the Maritime Farms. For the rearing of chicks it is a valuable and cheap feed, but as a scratch feed for winter use it is not suitable, though it does make a satisfactory mash feed when ground. Owing to the presence of weed seeds, it is better to be always ground before feeding.

POULTRY DISEASE INVESTIGATIONS.

During the year Dr. A. B. Wickware, Pathologist, in charge of poultry diseases, has, in addition to making the numerous diagnoses of sick and dead birds forwarded to the laboratory, conducted investigations with a number of poultry diseases. As a result of his work on intestinal parasites he published a bulletin "Intestinal Parasites of Poultry, their Prevention and Treatment," which gives considerable new data on this all-too-common trouble.

The same authority, in a small pamphlet entitled "Poultry Diseases Responsible for big National Loss," makes the statement that "at least 50 per cent of the chickens, young ducks and turkeys, and 10 per cent of the adult birds die each year from diseases, many of which are preventable."

If this is true, and there is every reason to believe that it is a conservative estimate, this would mean an actual loss of millions of dollars to the country. War conditions make it imperative that farmers and poultrymen endeavour to stop this national leak.

EXTENSION.

The survey work conducted in Quebec is still proving a valuable department of extension work. Another department of this work has been started in the sending out of copies of a "Farm Egg and Poultry Account" blank. Duplicate copies of these are returned to the office each month, and to each copy a reply is given pointing out how improvements can be made in the management. Valuable data are received by this Division on actual farm conditions, and suggestions are offered that will be helpful to the producers.

PROSPECTS OF THE INDUSTRY.

In spite of the high price of feed, there has been more enquiry for information and for stock and eggs this year than ever. Though the total number of poultry kept may not be increased, there is no doubt that the high cost of everything is tending to make producers put their plants on a business basis. The non-producers in the flock are being eliminated, more poultry keepers are keeping accounts, farm poultry plants are being renovated. The back-yard flocks are increasing, and though this year too many suburban families started out with immature pullets, those who had suitable birds have found that it is possible to produce eggs at a profit, and that table scraps that might go otherwise to waste can be turned into the very best of human food. In spite of the fact that no special propaganda for greater production of poultry has been conducted, the indications are that there will be an increased production brought about more by increased efficiency than by increased numbers.

THE TOBACCO DIVISION.

REPORT OF THE CHIEF OFFICER, F. CHARLAN.

Although the season of 1917 could not be considered a favourable one, the tobacco harvest was superior, both in quality and quantity, to that of the previous year.

In Quebec, the greatest difficulty met with was poor success in the seed-beds, owing to the cloudy and cool weather of the latter half of April and most of May. Thus while the preparation of the tobacco plantation was carried on under better conditions than in 1916, the seedlings for planting out were scarce in many localities.

Considerable damage was done by floods, storms, and hail. Heavy downfalls of rain were frequent, sometimes lasting for forty-eight hours, which prevented or destroyed the good effect of cultivation. Some plantations were almost completely killed out, simply for lack of air in the soil.

The summer was too cool to allow the plants to mature fully. This, with too much moisture, made the tobacco leaves thinner, so that fields which appeared to promise an almost normal yield gave a return much below the average in weight. Generally speaking, this fall in weight below average ran from 30 to 35 per cent in the province of Quebec. However, the finer texture of the leaf resulted in the cigar tobaccos being found suitable for use as wrappers in a larger proportion.

In Ontario, the tobacco crop of Essex and Kent suffered less from weather conditions, and was almost normal as to quality. This was true of the White Burleys and especially so of the flue-cured tobaccos. These yielded a much larger proportion of the true yellow leaf than usual.

The tobacco market was active. Owing to lowness of stocks on hand, due to a series of poor harvests, both in Canada and the United States, the demand was stronger than usual from manufacturers accustomed to handling our native tobaccos. The Ontario tobacco crop was all bought up before the close of 1917. Prices varied. White Burley brought from 15 to 22 cents a pound, and flue-cured tobaccos of the Virginia type from 30 to 38 cents. These prices were the highest ever obtained in Canada.

In Quebec, market conditions were the same. Wrapper tobaccos of good quality brought up to 35 cents a pound, according to time of sale; the average price was above 20 cents. The ordinary pipe tobaccos sold higher in sympathy.

In Ontario the curing process proceeded normally. In Quebec it was hindered by the excessive moisture content of the immature tobacco harvested, and was completely stopped by early severe winter weather which continued and interfered with the work of stemming.

Under the above conditions the Quebec-grown tobaccos were generally delivered to buyers with a larger proportion than usual of fat ribs, and an abnormal moisture-content. These drawbacks, however, were not limited to Quebec, but were also prevalent in Wisconsin and Ohio.

The use of charcoal stoves is more and more to be recommended for the curing of tobacco in Quebec. The experience of 1917 showed that these stoves should be lit about the middle of October, in order to make use of that part of the autumn when the cold is not too severe. The effect of the heaters is thus more marked, and less fuel is required.

HARROW, ONT., TOBACCO STATION.

Fall ploughing proved clearly superior to spring ploughing last year. In all cases the yield on fall-ploughed land was more uniform and of greater weight. Fail-

SESSIONAL PAPER No. 16

ploughing also permits of a better utilization of labour. Moreover, a large proportion of the grey worms are destroyed by the exposure of the larvæ to frost. It is the cheapest and probable the best means of combatting this pest.

The fight against the grey worm was continued at transplanting time by spreading a wash poisoned with Paris green, and by dipping the young plants, all but the roots, just before transplanting, into a solution of arsenate of lead in water ($1\frac{1}{2}$ ounces of the powder to one gallon of water). This method seemed more satisfactory than spraying with Paris green.

The results of tests with chemical fertilizers at Harrow in 1917 allow of recommending, for the yellow, flue-cured tobaccos, the following formula per acre:—

Sulphate of ammonia, 180 pounds.

Superphosphate (16 per cent), 400 pounds.

Sulphate of potassium, 200 pounds.

In practice the latter formula should be supplemented by an application, the preceding autumn, of a dressing of barnyard manure at the rate of 12 tons per acre. However, in order to bring out more clearly the effect of the artificial fertilizer, the plantation of White Burley did not receive any barnyard manure.

As to the yellow, flue-cured tobaccos, the direct application of barnyard manure is to be avoided as far as possible, in order to obtain a more clearly coloured leaf and to hasten maturity.

The use of seed produced in Canada from well-acclimatized varieties, cannot be too strongly recommended. This was again demonstrated in 1917, with two lots of White Burley of the same type, one grown from imported seed, the other from seed produced on the Harrow Station,

It may here be said that Canadian tobacco growers are becoming more and more alive to the value of home-grown seed, for the abundant seed-harvest at Harrow in 1917 was hardly sufficient to fill applications received.

FARNHAM, QUE., TOBACCO STATION.

The varieties grown at Farnham, 1917, were the Zimmer Spanish, the Big Ohio X Sumatra and the Yamaska. The crop at Farnham suffered considerably from numerous heavy downpours of rain, causing veritable floods. The parts saved of the Big Ohio X Sumatra and Yamaska yielded some comparative data as to the values of these two varieties. The Zimmer Spanish suffered much less and gave an almost normal yield, although the yield in weight, which had promised to be high, was scarcely 900 pounds per acre. Unfortunately, the texture of the leaf of this variety, which it had been planned to use as cigar binders, proved much more suitable for wrappers.

The seed-beds at Farnham were observed very closely during the spring of 1917. The temperature chart of the beds shows that those giving the best results had their highest temperature some inches below the surface. This is not surprising; it is explained by the greater reserve of heat which such a bed can hold. The conclusion to be drawn therefrom is that the Quebec tobacco grower should give up the cold bed entirely, even when covered with glass. They should, on the other hand, make up their beds fresh every year from the bottom, using, first, earth put in place in the spring so that it will become dried and warmed in the handling.

The practice sometimes followed of using seed-beds established the preceding year, simply scratching over the surface, and applying fertilizer if required, should be more and more abandoned. It is very easy, by using glazed frames, to warm the surface of such beds, but the heat so obtained does not penetrate very deeply, and such a bed cools rapidly after sunset.

ST. JACQUES L'ACHIGAN, QUE., TOBACCO STATION.

This Station yielded a good crop of Zimmer Spanish, although the leaves were rather thinner than desired. Maturity was better than at Farnham and the curing process was carried on more successfully. Only a small proportion of "fat ribs" was observed.

9 GEORGE V, A. 1919

CENTRAL FARM, OTTAWA, ONT.

The experimental area was especially devoted to the study of certain selections of Maryland and of binder tobaccos of the Cuban type (Cuban, Mexican, Brazilian) and also to the cultivation of some special nicotine-producing tobaccos. As in former years, as much Comstock Spanish, Connecticut and General Grant as possible was grown to produce seed for the annual distribution.

The season was not very favourable for seed production and, generally speaking, the vitality of the seed was lower, barely reaching 75 per cent. Moreover, all plants affected with mosaic had to be rejected, so that the seed crop was considerably reduced.

The tobaccos grown for nicotine extraction yielded a small quantity of seed for a more extended trial. As a rule, however, these varieties ripen poorly, and hence give only a small amount of alkaloid.

The Marylands developed normally but did not ripen well enough to attain the desired colour, with the exception of one selection tried for the first time, which, in spite of the unfavourable season, gave a fairly fine leaf of clear colour, suitable for cigarette manufacture.

Among the Cuban varieties tried, a number of plants were selected which seem to promise a satisfactory yield. If the aroma can be preserved it may be possible to propagate these in Canada where, so far, the Cuban varieties grown from imported seed have not yielded heavily enough to induce growers to produce them, in spite of the manufacturer's demand. The study of different varieties at Ottawa was completed by a large number of biometric observations in order to determine as closely as possible their physical characters and variations in Canada. This work is important in the case of newly introduced varieties, and is also valuable with sorts already acclimated in noting how their characteristics are maintained.

Warehousing.—Special attention was paid to the fermentation of binder tobaccos. The method followed in Ohio, slightly modified, gave good results on a lot of Yamaska of the 1915 crop. Of all binder tobaccos submitted to manufacturers for their opinion, this lot of Yamaska was perhaps the best received. It had first received a light fermentation in bales during the entire summer of 1916, then, during the winter of 1916-17, it was dampened and fermented in a warm room. During this operation the product was aired three times before being finally baled. A lot of Aurora, also of the 1915 crop, was treated in the same way and gave a binder of not quite so delicate an aroma as the Yamaska.

The Belgian tobacco of the 1917 crop, and also a small lot of Zimmer Spanish, gave binders worth studying. The best results with these seemed to be obtained in submitting them first to fermentation in bulk and then to a refining process in a warm room for four to six weeks, after having put up the tobacco in boxes as soon as the fermentation in bulk was completed.

Distribution of seed.—The number of samples sent out in the winter of 1917-18 was much greater than usual, amounting to about 6,000 samples. Most of these were distributed in the province of Quebec and were made up mainly of the Connecticuts, General Grant, and Comstock Spanish. The demand for tobaccos suitable for wrappers increased considerably. In 1917 for the first time Canadian manufacturers tried for the above purpose the Connecticuts grown in the counties north of Montreal.

The high prices paid for the 1917 crop attracted the attention of growers in Quebec and it is probable that the 1918 crop will be the largest ever produced. The same is true of Ontario where, with a favourable season, a harvest greater than the record year of 1911 may be expected.

TOBACCO DISEASES.

As a whole, the tobacco plantations in Ontario suffered to about the same extent as in the two previous years. Root rot was less prevalent owing to the drier season, but cool weather, almost cold at the opening of the season, caused a considerable spread of mosaic. The proportion of plants attacked was much higher than in 1916.

SESSIONAL PAPER No. 16

DIVISION OF ECONOMIC FIBRE PRODUCTION.**REPORT OF THE FIBRE SPECIALIST, R. J. HUTCHINSON.**

During the past year, investigations of economic fibre plants, and the study of the problems connected with flax fibre production in Canada were continued.

Experiments were carried on to determine what districts in Canada are suitable for flax fibre culture. Flax grown on these several areas has been collected at Ottawa and retted and scutched in the fully equipped flax mill situated at the Central Experimental Farm. The fibre obtained from flax grown in the western part of British Columbia, southwestern part of Ontario, the valley of the St. Lawrence, and the Maritime Provinces proved to be first-class in quality, and was readily sold to United States spinners. These report that the spinning qualities were equal to those of the best grades of Irish fibre, and suitable for use in the manufacture of high class linen fabric, a material limited as to supply, but absolutely essential in the manufacture of aeroplane wings and needed for machine-gun webbing, ambulance and truck covers, thread for sewing uniforms, and a number of other uses. An exhibit of flax fibre and products prepared by the Experimental Farm won a gold medal at the Toronto Exhibition last year.

A convention of flax growers was held at London, Ont., for the purpose of improving flax seed marketing conditions. In order to maintain the reputation that has been established in Ireland and the United States, it was recommended that a standard seed bag be used, having the trade mark stenciled on it, and that all fibre-growing seed be subject to government inspection. Besides it was agreed upon to establish a high grade of fibre this season.

To encourage farmers, in those sections of Canada suitable for the production of flax fibre, to engage in this occupation, a special circular No. 20 has been issued, which points out the necessity for the production of this crop, and describes methods in the cultivation, handling and marketing of the fibre.

To turn to account in the fibre market the vast quantities of seed flax straw produced in the western provinces, the method of cultivation would need to be changed. Heavier sowing than the customary half-bushel per acre would improve the quality of the straw, and probably yield more seed as well. Closer cutting and more careful threshing of such flax would be required to make the fibre at all suitable for coarse yarns or twines. A discovery of a new process for the treatment of prairie flax has been made by the Flaxen Fibre Development Association, Regina, Sask. The fibre acquires the permanence of linen, and a large spinning range. Such a discovery under present conditions is a matter for national congratulation, when the husbanding of national resources has become vital. It has been the writer's privilege to examine about fifty samples of the finished product. Experiments will be continued along this line until conclusive results have been secured.

During the coming year it is hoped to establish modern mills in some of the flax growing centres and to continue investigations already begun.

DIVISION OF ILLUSTRATION STATIONS.**REPORT OF THE SUPERVISOR, JOHN FIXTER.**

Owing to the drought in parts of Alberta and Saskatchewan, the Illustration work in 1917 has shown the value of proper cultivation and the value of good seed.

This being the third season of the Illustration work in the province of Quebec, the value of rotation of crops is quite noticeable and is arousing the interest of the farmers in the districts in which the Stations are located.

ILLUSTRATION STATIONS IN SASKATCHEWAN.

Assiniboia.—Operator, P. J. H. Warren. The season of 1917 opened late, but there was a good supply of moisture and the soil was in good condition. The rainfall during the period of growth was light and crop yields, especially of oats, below the average. Wheat was sown May 5, oats May 12, and corn May 19. All crops except hay were completely destroyed by a hailstorm on July 13.

	Yield per acre.	Cost.
Alfalfa (estimated)	$\frac{1}{2}$ ton.	\$7 91 per ton.
Western Rye Grass (estimated)	$1\frac{1}{2}$ tons.	2 86 "

Cabri.—Operator, F. W. Abraham. The season of 1917 opened fairly late, but the soil was moist and in good condition for growth. Wheat sown May 2 ripened August 15. Oats sown May 18 ripened September 8. Corn sown June 4 was harvested September 14. The season was a fairly dry one.

	Yield per acre.	Cost.
Wheat continuously	20 bush. 12 lb.	51 $\frac{1}{2}$ c. per bush.
Wheat in the 2-year rotation. .. .	31 bush. 12 lb.	49 c. "
Wheat in the 3-year rotation. .. .	31 bush. 30 lb.	45 c. "
Wheat after corn	24 bush.	36 c. "
Oats in the 3-year rotation. .. .	43 bush. 12 lb.	32 c. "
Alfalfa seed yielded	126 $\frac{1}{2}$ lb.	\$2 78 $\frac{1}{2}$ "
Alfalfa forage (estimated). .. .	1 ton.	4 19 per ton.
Western rye grass (estimated) .. .	1 ton.	4 46 "
Corn (estimated)	2 tons.	3 40 "

Biggar.—Operator, Dr. S. E. Shaw. The season here was rather late in opening but there was sufficient moisture at the time of seeding. It was quite dry throughout the growing season and all crops were light. Wheat sown April 27 ripened August 16. Oats sown May 8 ripened August 16. Corn sown May 16 was frozen down May 28.

	Yield per acre.	Cost
Wheat continuously	9 $\frac{2}{5}$ bush.	\$1 69 $\frac{2}{5}$ per bush.
Wheat in the 2-year rotation. .. .	9 $\frac{3}{5}$ bush.	1 63 $\frac{3}{5}$ "
Wheat in the 3-year rotation. .. .	12 $\frac{1}{5}$ bush.	1 09 $\frac{7}{10}$ "
Wheat after corn	8 $\frac{4}{5}$ bush.	1 80 $\frac{2}{5}$ "
Oats in the 3-year rotation	15 $\frac{3}{5}$ bush.	0 54 $\frac{9}{10}$ "

Alfalfa and Western rye grass seeded this year.
Corn frozen down twice in spring, a failure.

Herbert.—Operator, Milton Holmes. The season opened later than usual with a good supply of moisture in the soil. Wheat sown May 2 ripened August 13. Oats sown May 2 ripened August 8. Corn sown May 24 was cut September 21. Very little rain fell during the growing season and as a result all crops were light.

	Yield per acre.	Cost.
Wheat continuously	2 bush.	\$2 46 $\frac{2}{5}$ per bush.
Wheat in the 2-year rotation	12 bush.	0 99 $\frac{1}{2}$ "
Wheat in the 3-year rotation	16 bush.	0 68 $\frac{4}{5}$ "
Wheat after corn	14 bush.	0 68 "
Oats in the 3-year rotation	12 bush.	0 88 $\frac{2}{5}$ "
Alfalfa (estimated)	$\frac{2}{5}$ ton.	6 03 per ton.
Western rye grass (estimated) .. .	2 tons.	2 28 "
Corn (estimated)	$1\frac{1}{2}$ tons.	6 94 $\frac{1}{2}$ "

Kindersley.—Operator, F. E. Halpenny. The season of 1917 opened quite late, owing to a late snowfall. Part of the season was dry but on the whole there was sufficient moisture in the growing season to produce a fair crop. Wheat sown May 12

SESSIONAL PAPER No. 16

ripened August 24, oats sown May 9 were harvested September 4, and corn sown May 25 was cut on September 17.

	Yield per acre.	Cost.
Wheat continuously..	8 bush.	\$1 16 $\frac{1}{2}$ per bush.
Wheat in the 2-year rotation.. . . .	20 bush.	0 64 $\frac{2}{5}$ "
Wheat in the 3-year rotation.. . . .	18 $\frac{2}{5}$ bush.	0 61 $\frac{2}{5}$ "
Wheat after corn..	19 bush.	0 59 $\frac{3}{10}$ "
Oats in the 3-year rotation.. . . .	43 $\frac{1}{4}$ bush.	0 26 $\frac{9}{10}$ "
Alfalfa (estimated)..	1 $\frac{1}{2}$ tons.	3 20 per ton.
Western rye grass (estimated).. . . .	2 $\frac{1}{4}$ tons.	1 52 $\frac{1}{2}$ "
Corn (estimated)..	2 tons.	5 42 $\frac{1}{10}$ "

Lloydminster.—Operator, Hugh Hill. The spring of 1917 opened later than usual, with plenty of moisture in the soil. This was one of the driest seasons in the district for some years, and crops were below the average, especially the oat crop. Wheat sown May 5 ripened September 4. Oats sown May 12 ripened August 28. Corn was sown May 25 but was frozen down early in August.

	Yield per acre.	Cost.
Wheat continuously..	11 bush.	\$0 76 $\frac{2}{5}$ per bush.
Wheat in the 2-year rotation.. . . .	20 bush.	0 65 $\frac{2}{5}$ "
Wheat in the 3-year rotation.. . . .	16 bush.	0 69 $\frac{7}{10}$ "
Wheat after corn..	20 bush.	0 44 $\frac{2}{5}$ "
Alfalfa (estimated)	$\frac{1}{2}$ ton.	8 04 per ton.
Western rye grass (estimated).. . . .	1 ton.	5 24 "

Maple Creek.—Operator, G. L. Hammond. The spring of 1917 was rather late, but there was a good supply of moisture at seeding time and crops did not suffer much from drought until after they were in head. Wheat sown May 3 ripened August 9, oats sown May 26 ripened August 23 and corn sown May 28 was harvested September 11.

	Yield per acre.	Cost.
Wheat continuously..	16 bush.	\$0 56 $\frac{1}{10}$ per bush.
Wheat in the 2-year rotation.. . . .	20 bush.	0 67 $\frac{2}{5}$ "
Wheat in the 3-year rotation.. . . .	21 bush.	0 54 $\frac{3}{10}$ "
Wheat after corn..	11 $\frac{2}{5}$ bush.	0 60 $\frac{2}{5}$ "
Oats in the 3-year rotation.. . . .	12 bush.	0 83 $\frac{2}{5}$ "
Alfalfa (seed)..	150 lb.	2 98 $\frac{2}{5}$ "
Alfalfa (forage) (estimated).. . . .	2 tons.	2 65 $\frac{1}{2}$ per ton.
Western rye grass (estimated)	1 ton.	4 01 $\frac{1}{2}$ "
Corn (estimated)..	2 tons.	5 79 $\frac{1}{2}$ "

Moose Jaw.—Operator, J. J. Glassford. The spring of 1917 opened about 10 days later than the average. There was a good supply of moisture and the soil was in good tilth. The rain-fall during the growing season was light and crop yields below the average, particularly oats. Wheat sown May 2 ripened August 13, oats sown June 20, were cut for green feed August 24 and corn, sown May 17, was cut September 15.

	Yield per acre.	Cost.
Wheat in the 2-year rotation.. . . .	28 bush.	\$0 51 $\frac{7}{10}$ per bush.
Wheat in the 3-year rotation.. . . .	28 bush.	0 45 "
Wheat after corn..	18 bush.	0 45 $\frac{9}{10}$ "
Oats—cut for green feed to catch wild oats.		
Alfalfa (estimated)..	1 ton.	5 02 $\frac{2}{5}$ per ton.
Western rye grass (estimated).. . . .	1 ton.	3 89 "
Corn (estimated)..	2 tons.	4 77 $\frac{7}{10}$ "

Pambrum.—Operator, C. W. Appलगren. The season of 1917 opened later than usual here with considerable moisture in the soil. The subsequent rainfall throughout the growing season was very light, and as result yields were low. Wheat sown

9 GEORGE V, A. 1919

May 5 ripened August 13, oats sown May 14 were harvested August 25 and corn sown May 24 was harvested September 13.

	Yield per acre.	Cost.
Wheat continuously..	2 $\frac{3}{4}$ bush.	\$2 94 $\frac{9}{10}$ per bush.
Wheat in the 2-year rotation.. . . .	14 $\frac{3}{4}$ bush.	0 90 "
Wheat in the 3-year rotation.. . . .	14 $\frac{5}{12}$ bush.	0 76 $\frac{1}{2}$ "
Wheat after corn..	12 bush.	0 64 $\frac{3}{4}$ "
Oats in the 3-year rotation—cut for green feed, light crop.		
Alfalfa—reseeded.		
Western rye grass (estimated).. . . .	1,100 lb.	7 31 per ton.
Corn (estimated)..	1 $\frac{1}{4}$ tons.	8 30 $\frac{3}{4}$ "

Prelate.—Operator, W. Huxtable. The season of 1917 opened about a week later than the average. The soil was moist at time of seeding but the season was dry and crop yields below the average, oats being very light. Wheat sown April 27 ripened August 18. Oats sown May 5 ripened September 2. Corn sown May 16 made such poor growth it had to be ploughed down.

	Yield per acre.	Cost.
Wheat continuously..	4 $\frac{3}{4}$ bush.	\$1 55 $\frac{9}{10}$ per bush.
Wheat in the 2-year rotation.. . . .	17 bush.	0 76 $\frac{7}{10}$ "
Wheat in the 3-year rotation.. . . .	18 bush.	0 60 $\frac{3}{10}$ "
Wheat after corn..	11 bush.	0 81 $\frac{7}{10}$ "
Oats in the 3-year rotation..	6 bush.	1 47 $\frac{1}{2}$ "
Alfalfa (estimated)..	800 lb.	9 13 $\frac{7}{10}$ per ton.
Western rye grass (estimated).. . . .	1,500 lb.	5 40 $\frac{3}{4}$ "

Radville.—Operator, Lewis Kroon. The season of 1917 opened about two weeks later than the average. There was plenty of moisture in the spring and the soil was in good tilth, so crops had a good start. Very little rain fell after seeding until harvest, hence the crops were light. Wheat sown May 7 ripened August 14. Oats sown May 22 were cut August 31. Corn sown June 1 was cut August 30.

	Yield per acre.	Cost.
Wheat continuously..	8 bush.	\$ 1 14 $\frac{1}{10}$ per bush
Wheat in the 2-year rotation.. . . .	15 bush.	1 02 $\frac{7}{10}$ "
Wheat in the 3-year rotation.. . . .	15 bush.	81 08 "
Wheat after corn..	9 bush.	1 53 $\frac{1}{10}$ "
Oats—cut for green feed, light crop.		
Alfalfa and Western rye grass—seeded this year.		
Corn (estimated)..	$\frac{3}{4}$ ton.	22 72 per ton.

Shaunavon.—Operator, Neil McLean. The spring of 1917 opened quite late, but there was plenty of moisture and conditions were favourable for growth. During the growing season the rainfall was very light, and as a result crop yields were low, especially on stubble land. Wheat sown May 7 ripened August 16. Oats sown May 8 were cut early for green feed. Corn was sown May 22 and was badly frozen down early in August.

	Yield per acre.	Cost.
Wheat continuously—a failure.		
Wheat in the 2-year rotation.. . . .	13 bush.	\$1 01 $\frac{1}{2}$ per bush.
Wheat in the 3-year rotation.. . . .	14 $\frac{1}{2}$ bush.	0 80 $\frac{3}{10}$ "
Wheat after corn..	10 bush.	0 91 $\frac{3}{10}$ "
Oats in the 3-year rotation—cut for green feed, light crop.		
Alfalfa (estimated)..	1 $\frac{1}{2}$ tons.	3 38 $\frac{1}{10}$ per ton.
Western rye grass (estimated).. . . .	1 $\frac{1}{2}$ tons.	2 91 $\frac{3}{10}$ "
Corn a failure, frozen early in the autumn.		

Weyburn.—Operator, E. Meredith. Spring opened fairly late with plenty of moisture and the soil in good tilth. Wheat sown May 3 ripened August 17. Oats

SESSIONAL PAPER No. 16

sown May 19 were harvested September 1, and corn sown May 19 was harvested second week of September. The season was quite dry and crops suffered considerably.

	Yield per acre.	Cost
Wheat continuously..	13 bush. 15 lb.	\$0 58 $\frac{1}{10}$ per bush.
Wheat in the 2-year rotation.. . . .	17 bush.	0 77 $\frac{2}{5}$ "
Wheat in the 3-year rotation.. . . .	19 bush.	0 64 $\frac{1}{10}$ "
Oats in the 3-year rotation.. . . .	15 bush.	0 71 $\frac{1}{10}$ "
Alfalfa..	1 ton.	8 24 per ton.
Western rye grass..	2 tons.	2 90 "
Corn..	2 tons.	3 92 $\frac{3}{19}$

ILLUSTRATION STATIONS IN ALBERTA.

Bow Island—Operator, Martin Mortensen.—The season opened later than usual with a good moisture supply. The rainfall during the growing season was light, and crops suffered from drought. Wheat sown May 3 ripened August 14, oats sown May 3 ripened August 13, and corn sown May 24 was cut August 28.

	Yield per acre.	Cost.
Wheat continuously..	13 bush.	\$0 74 per bush.
Wheat in the 2-year rotation.. . . .	19 $\frac{1}{2}$ bush.	0 80 "
Wheat in the 3-year rotation.. . . .	18 $\frac{1}{2}$ bush.	0 72 "
Wheat after corn..	16 $\frac{2}{5}$ bush.	0 59 "
Oats in the 3-year rotation.. . . .	19 bush.	0 66 \cdot 3 "
Alfalfa, seeded this year, no crop.		
Western rye grass (estimated).. . . .	1 $\frac{1}{2}$ tons.	5 63 per ton.
Corn (estimated)..	1,200 lb.	15 87 "

Grassy Lake.—Operator, D. C. Perry. The spring opened about the usual time with plenty of moisture. The second half of the growing season was dry and crops were not so heavy as expected. Wheat sown April 13 ripened August 14, oats sown May 3 ripened August 20, and corn sown May 18 was cut September 29.

	Yield per acre.	Cost.
Wheat continuously..	15 bush.	\$0 67 per bush.
Wheat in the 2-year rotation.. . . .	24 bush.	0 65 \cdot 5 "
Wheat in the 3-year rotation.. . . .	24 bush.	0 57 \cdot 5 "
Oats in the 3-year rotation.. . . .	30 bush.	0 44 \cdot 4 "
Alfalfa, seeded this year.		
Western rye grass (estimated).. . . .	2 tons.	4 47 per ton.

Whitla.—Operator, R. H. Babe. The spring of 1917 opened rather late with a fair supply of moisture, but the season on the whole was quite dry. Wheat sown May 2 ripened August 13, oats sown May 18 ripened August 23, and corn sown May 19 was cut September 1.

	Yield per acre.	Cost.
Wheat continuously..	5 $\frac{1}{2}$ bush.	\$1 77 per bush.
Wheat in the 2-year rotation.. . . .	19 $\frac{1}{2}$ bush.	0 89 "
Wheat in the 3-year rotation.. . . .	19 bush.	0 74 \cdot 7 "
Wheat after corn..	14 $\frac{1}{2}$ bush.	0 66 \cdot 8 "
Oats in the 3-year rotation.. . . .	17 bush.	0 72 \cdot 4 "
Alfalfa (estimated)..	1 ton.	7 08 "
Western rye grass (estimated).. . . .	2 tons.	3 61 per ton.
Corn (estimated)..	1 ton.	11 58 "

Manyberries.—Operator, M. Mickelson. The season opened about a week later than usual. Early in the growing season there was a good supply of moisture but later it became very dry and crop yields were disappointing. Wheat was sown April 27, and oats May 11.

	Yield per acre.	Cost.
Wheat continuously..	5 bush.	\$0 82 per bush.
Wheat in the 2-year rotation.. . . .	10 $\frac{1}{2}$ bush.	1 18 "
Wheat in the 3-year rotation.. . . .	12 bush.	0 90 "
Wheat after corn..	8 $\frac{1}{2}$ bush.	0 98 "
Oats in the 3-year rotation—no crop on account of drought.		
Alfalfa (estimated)..	1,667 lb.	9 44 per ton.
Western rye grass (estimated).. . . .	2,500 lb.	4 61 "
Corn, no crop.		

9 GEORGE V, A. 1919

High River.—Operator, B. F. Kiser. Spring opened at the usual time with plenty of moisture. Later in the season the weather was quite dry and hot, and crops suffered from drought. Wheat was sown April 20, oats June 3, and corn June 12. All crops except alfalfa and rye grass were destroyed by hail.

	Yield per acre.	Cost.
Alfalfa (estimated)	1 ton.	\$5 28 per ton.
Western rye grass (estimated)	1½ tons.	3 88 "

Magrath.—Operator, J. A. Meldrum. The spring opened the usual time with favourable conditions. There was sufficient rainfall until the last of June, when it became dry and crop yields were not so good as expected. Wheat sown April 14 ripened August 20, oats sown May 17 ripened August 20, and corn sown June 1 was cut September 3.

	Yield per acre.	Cost.
Wheat continuously	18½ bush.	\$0 55·2 per bush.
Wheat in the 2-year rotation	29 bush.	0 55·4 "
Wheat in the 3-year rotation	27½ bush.	0 51·6 "
Wheat after corn	27½ bush.	0 38 "
Oats in the 3-year rotation	34 bush.	0 35·7 "
Alfalfa (estimated)	1 ton.	4 14 per ton.
Western rye grass (estimated)	2 tons.	2 72 "
Corn (estimated)	7 tons.	1 00 "

Pincher Creek.—Operator, Messrs. Sandgren and Carlson. Spring opened later than usual with plenty of moisture to start the crop. The weather was favourable until the middle of June, when it became dry. Wheat sown May 7 ripened August 27. Oats sown May 8 ripened August 27. Corn sown June 5 was cut August 27.

	Yield per acre.	Cost.
Wheat continuously	11 bush.	\$0 83·7 per bush.
Wheat in the 2-year rotation	27½ bush.	0 57 "
Wheat in the 3-year rotation	27½ bush.	0 50·9 "
Wheat after corn	15½ bush.	1 03 "
Oats in the 3-year rotation	33½ bush.	0 45·8 "
Alfalfa (estimated)	1½ tons.	4 20 per ton.
Western rye grass (estimated)	2 tons.	4 26 "
Corn, light crop, no estimate.		

Macleod.—Operator, Norman Grier. The season opened the usual time. There was plenty of moisture up to the middle of June when it became dry and crops suffered. Wheat sown April 21 ripened August 20, and oats sown May 10 were cut August 20. There was no corn grown at this station this year.

	Yield per acre.	Cost.
Wheat continuously	22½ bush.	\$0 43·6 per bush.
Wheat in the 2-year rotation	26 bush.	0 55 "
Wheat in the 3-year rotation	28 bush.	0 46·9 "
Wheat after corn	29½ bush.	0 37·8 "
Oats in the 3-year rotation	62 bush.	0 22·6 "
Alfalfa (estimated)	1,000 lb.	7 05 per ton.
Western rye grass	900 lb. seed.	10 29 per acre.

Munson.—Operator, R. R. Fraser. The season of 1917 opened late with a good supply of moisture in the soil. The latter part of the season was dry but crops came through well. Wheat sown May 8 ripened August 24. Oats sown May 11 ripened August 28. Corn sown May 15 was cut August 29.

	Yield per acre.	Cost.
Wheat continuously	15 bush.	\$0 69·9 per bush.
Wheat in the 2-year rotation	38 bush.	0 48·6 "
Wheat in the 3-year rotation	38 bush.	0 43·3 "
Wheat after corn	38 bush.	0 45 "
Oats in the 3-year rotation	74 bush.	0 26 "
Alfalfa seeded this year.		
Western rye grass seeded this year.		
Corn (estimated)	1 ton.	11 59 per ton.

SESSIONAL PAPER No. 16

Milk River.—Operator, B. L. Cornwall. The season was late in opening but the soil was quite moist, so crops had a good start. The latter part of the growing season was dry. Wheat sown May 8 ripened August 23. Oats sown May 22 ripened September 1. Corn sown May 23 was cut September 1.

	Yield per acre.	Cost.
Wheat continuously.. . . .	13 bush.	\$0 67·9 per bush.
Wheat in the 2-year rotation.. . . .	22½ bush.	0 64 "
Wheat in the 3-year rotation.. . . .	23 bush.	0 54·6 "
Wheat after corn.. . . .	26 bush.	0 35·8 "
Oats in the 3-year rotation.. . . .	33½ bush.	0 41·6 "
Alfalfa (estimated).. . . .	2 tons.	2 48 per ton.
Western rye grass cut for seed.		
Corn (estimated).. . . .	1,500 lb.	9 14 "

Empress.—Operator, Frank Barrie. The season opened about the usual time with a good supply of moisture. On the whole it was a dry season and crop yields were fair except oats which were quite light. Wheat sown April 17 ripened August 9, oats sown May 14 ripened August 21 and corn sown May 24 was cut September 11.

	Yield per acre.	Cost.
Wheat continuously.. . . .	12 bush.	\$0 74 per bush.
Wheat in the 2-year rotation.. . . .	25 bush.	0 63·2 "
Wheat in the 3-year rotation.. . . .	24 bush.	0 57·7 "
Wheat after corn.. . . .	23 bush.	0 49·5 "
Oats in the 3-year rotation.. . . .	16½ bush.	0 32 "
Alfalfa (estimated).. . . .	975 lb.	1 40 per 100 lb.
Western rye grass (estimated).. . . .	1,200 lb.	1 01 "
Corn (estimated).. . . .	3 tons.	2 08 per ton.

Foremost.—Operator, T. H. Frankish. The season of 1917 opened about the usual time with a good supply of moisture. The latter part of the growing season was dry and crops ripened too quickly. Wheat sown April 21 ripened August 14. Oats sown May 23 ripened August 16. Corn sown May 17 was cut August 24.

	Yield per acre.	Cost.
Wheat continuously.. . . .	9½ bush.	\$0 83·7 per bush.
Wheat in the 2-year rotation.. . . .	23½ bush.	0 70 "
Wheat in the 3-year rotation.. . . .	27½ bush.	0 50·8 "
Wheat after corn.. . . .	14½ bush.	0 74·5 "
Oats in the 3-year rotation.. . . .	22 bush.	0 51 "
Alfalfa (estimated).. . . .	1 ton.	3 73 per ton.
Western rye grass (estimated).. . . .	1,500 lb.	3 54 "
Corn (estimated).. . . .	1,500 lb.	10 95 "

Carmangay.—Operator, J. A. Neilson. The spring of 1917 opened in fair time. There was a good supply of moisture until the crops were in head. Then it became dry. Wheat sown April 23, ripened August 24. Oats sown May 15, ripened September 9. Corn sown May 20 was cut September 7.

	Yield per acre.	Cost.
Wheat continuously.. . . .	5 bush. 42 lb.	\$1 34 per bush.
Wheat in the 2-year rotation.. . . .	23 bush. 21 lb.	0 60·8 "
Wheat in the 3-year rotation.. . . .	21 bush. 52 lb.	0 56 "
Wheat after corn.. . . .	20 bush. 32 lb.	0 54·3 "
Alfalfa (estimated).. . . .	1½ tons.	2 77 per ton.
Western rye grass (estimated)	1,810 lb.	4 04 "

Jenner.—Operator, Jerry Fisher. The season of 1917 opened a little later than usual with plenty of moisture in the soil. The first part of the growing season was favourable but later it became quite dry and crop yields were disappointing. Wheat

sown April 26, ripened August 18. Oats sown May 5 were a failure on account of drought. Corn sown May 19 was cut September 1.

	Yield per acre.	Cost.
Wheat continuously..	12½ bush.	\$0 69·8 per bush.
Wheat in the 2-year rotation.. . . .	14½ bush.	1 02 “
Wheat in the 3-year rotation.. . . .	20 bush.	0 63·3 “
Wheat after corn..	15½ bush.	0 61 “
Oats in the 3-year rotation.. . . .	No yield.	
Alfalfa (estimated)..	1 ton.	4 15 per ton.
Western rye grass (estimated).. . . .	1½ tons.	5 15 “
Corn (estimated)..	4 tons.	1 82 “

ILLUSTRATION STATIONS IN QUEBEC.

Aubrey, Chateauguay County.—Operator, Samuel Reddick. The soil on this farm is a heavy clay loam, which would be improved by tile drainage, particularly when corn is grown on it. Four-year rotation:—

Field A: Corn, Leaming and Golden Glow, gave an estimated yield of 10 tons per acre, costing \$26.56 per acre.

Field B: Banner oats yielded 52 bushels 3 pounds per acre, costing \$16.04.

Field C and D: Clover hay. First crop harvested in June gave an estimated yield of 2 tons 400 pounds per acre, costing \$14.03. A second crop from the same field was harvested in October, which gave an estimated yield of 1¼ tons per acre. Out of this second crop was threshed 231 pounds of seed per acre. Much improvement was seen in the hay crop on this Station.

Drummondville, Drummond County.—Operator, Amédée Marier. The soil on this farm is a good sandy loam but requires tile drainage. Four-year rotation:—

Field A: Hay gave, in two cuts the same season, an estimated yield of 1 ton 782 pounds per acre, costing \$7.55 per acre.

Field B: Corn, Longfellow, estimated yield 8 tons per acre, costing \$21.54 per acre.

Field C: Clover hay, 2 tons per acre, costing \$11.35 per acre.

Field D: Banner oats yielded 33 bushels per acre, costing \$11.41 per acre.

Lac à la Tortue, Champlain County.—Operator, S. T. Lupien. The soil on this station is exceptionally light sand depleted of plant food, and appears to be underlaid with water from an adjoining lake. The four-year rotation started on this station is making satisfactory progress:—

Field A: Banner oats yielded 15 bushels per acre, costing \$14.63 per acre.

Field B: Hay, estimated three-quarters of a ton per acre, costing \$13.75 per acre.

Field C: Corn, estimated yield 8 tons per acre, dry fodder, costing \$15.92 per acre. Potatoes, 51 bushels, costing \$38.68. Swedes, 7 tons per acre, costing \$32.90.

Field D: Barley yielded 18 bushels per acre, costing \$14.20 per acre. Straw not estimated.

Nomining, Labelle County.—Operator, E. Lamoureux. The soil on this station is a light sand depleted of humus, on account of its rolling character and the surrounding district. The growing of forest trees would be more suitable than farm crops. Four-year rotation:—

Fields A and B: Hay, estimated yield three-quarters of a ton per acre, costing \$9.98 per acre

Field C: Potatoes yielded 228 bushels per acre, costing \$57.47 per acre.

Field D: Banner oats yielded 45 bushels per acre, costing \$16.25.

New Carlisle, Bonaventure County.—Operator, E. M. Legallais. The soil on this station is heavy, sandy loam, and requires drainage. Couch grass and other weeds are

SESSIONAL PAPER No. 16

abundant, and several hoed crops will be required to eradicate them. Four-year rotation:—

Field A: Potatoes yielded 110 bushels per acre, costing \$38.73 per acre. Swedes and mangels yielded 16 tons per acre, costing \$2.42 per ton.

Fields B and C: Hay, estimated yield 1 ton 300 pounds per acre, costing \$10.30 per acre.

Field D: Oats, Ligowo; yield 31 bushels per acre, costing \$19.65. Straw not estimated.

St. Isidore, Dorchester County.—Operator, Adelard Bilodeau. Owing to excessive moisture and lack of tile drainage, crops on the Illustration Station, as well as in the surrounding district, were below the average.

Field A: Clover hay, yield estimated 2 tons per acre, costing \$11.62 per acre.

Field B: Banner oats yielded 30 bushels per acre, costing \$16.39 per acre.

Field C: Corn, estimated yield 7 tons per acre, costing \$28.42 per acre.

Field D: Hay, estimated yield 1½ tons per acre, costing \$11.83 per acre.

Rimouski, Rimouski County.—Operator, Nazaire Begin. Three-year rotation, as follows:—

Field A: Potatoes yielded 171 bushels per acre, costing \$74.63 per acre. Corn, estimated yield 6¼ tons dry fodder, costing \$42.24 per acre.

Field B: Banner oats yielded 42 bushels per acre, costing \$15.98 per acre.

Field C: Hay, estimated yield in two cuts, 2 tons 812 pounds per acre, costing \$15.98.

Four-year rotation, as follows:—

Field A: Banner oats yielded 47 bushels per acre, costing \$16.31.

Field B: Potatoes yielded 217 bushels per acre, costing \$74.44. Turnips and mangels yielded 12 tons per acre, costing \$76.79 per acre.

Field C: Hay, estimated yield 1 ton 314 pounds per acre, cost \$13.96.

Field D: Banner oats yield 48¾ bushels per acre, cost \$15.07 per acre.

St. Gédéon, Chicoutimi County.—Operator, Wilfrid Simard. Three-year rotation:—

Field A: Marquis wheat gave a yield of 24 bushels 3 pounds per acre, costing \$18.88 per acre.

Field B: Potatoes yielded 240 bushels per acre, costing \$69.44 per acre. Corn yielded 7 tons per acre, costing \$26.56 per acre.

Field C: Clover hay yielded 2 tons per acre, costing \$15.33 per acre.

Four-year rotation, as follows:—

Field A: Banner oats yielded 58 bushels per acre, costing \$16.48 per acre, straw not calculated.

Field B: Clover hay yielded 2½ tons per acre, costing \$12.53 per acre.

Field C: Clover hay yielded 1½ tons per acre, costing \$11.46 per acre.

Field D: Roots yielded 12 tons per acre, costing \$46.08 per acre.

Stanbridge East, Missisquoi County.—Operator, Chas. S. Moore. Owing to the heavy, wet nature of the soil, seeding was about ten days later than usual.

Fields A and B: First-year hay cut. Most of the crop was clover, which gave an estimated yield of 1 ton 1,200 pounds per acre, costing \$15.19. A second crop of clover was harvested the same season, yielding 1,400 pounds per acre. This crop was threshed, giving a yield of 40 pounds of clover seed, per acre, at a cost of 12½ cents per pound.

Field C: Banner oats yielded 49 bushels per acre, costing 41 cents per bushel. No allowance is made for straw.

Field D: Corn, Quebec Yellow. Owing to the unfavourable season a light crop of seed was harvested, yielding 88 bushels cob and about 4 tons of fodder per acre, costing \$26.50 per acre.

9 GEORGE V, A. 1919

Ste. Julie, Verchères.—Operator, Adolphe Hébert. The soil on this station is a heavy sandy loam which requires tile drainage. Four-year rotation:—

Fields A and B: Clover hay. First crop gave an estimated yield of 1½ tons per acre, costing \$12.67 per acre. A second crop harvested the same season gave an estimated yield of 1 ton per acre, out of which crop 90 pounds per acre of clover seed was threshed.

Field C: Corn, Leaming, Golden Glow, and Longfellow, gave an estimated yield of 10 tons per acre, costing \$19.38 per acre.

Field D: Banner oats yielded 31 bushels per acre, costing \$12.95 per acre.

The clover fields above mentioned won first prize in a county competition.

DIVISION OF EXTENSION AND PUBLICITY.

REPORT OF THE OFFICER-IN-CHARGE, W. A. LANG.

The work of the Division of Extension and Publicity was continued during the year, the main lines being those enumerated in previous reports, and may briefly be recapitulated as follows:—

1. The display at fairs and exhibitions of an Experimental Farm Exhibit.
2. The issuing and distribution of exhibition circulars.
3. The enlarging of the mailing lists.

The number of fairs and exhibitions attended was slightly larger than the previous year, amounting to 146 in all; 29 of these were covered by exhibits sent out from the Central Experimental Farm, and the remaining 117 were attended to by the branch Farms and Stations. In a general way the plan was to utilize each branch Farm or Station as a centre from which the Experimental Farms Exhibit was sent out to a circuit of fairs within a reasonable radius of the Farm or Station. The staging for these exhibits, and the main features of the work displayed, were prepared at Ottawa. This ensures the requisite amount of uniformity, and tends to emphasize the solidarity and cohesion of the Experimental Farms system. To these main features are added such local items as the branch Farm Superintendent considers interesting and worthy of display. Fresh flowers, fruits, etc., are, of course, supplied by the Superintendent, and add a great deal to the attractiveness of the whole. At these fairs, a distribution is made of exhibition circulars, of which we have at present a very comprehensive collection covering most of the main features of agricultural effort in Canada, and, in addition, names and addresses of those wishing to be placed on the departmental mailing list are taken. During the last season almost 16,000 names were added in this way. It is unnecessary to report in detail as to the reception which the Experimental Farms exhibit met at the fairs throughout the country, but the general comment may be made that a very encouraging amount of interest was shown. At all points where an exhibit was made, requests were received for a return visit during the next season, and a number of applications have been received from the managers of fairs at which an exhibit has not yet been made that we display there another year. These requests are as far as possible being met, the only difficulty in the way being the number of cases where dates clash, owing to such a large number of country fairs being held throughout Canada within such a short space of time.

Owing to the expansion of the exhibition work, it was found impossible to give the necessary amount of personal attention to the preparation of "Seasonable Hints" and the editing and issuing of press articles, and, consequently, other arrangements were made for the handling of these in future. The time so gained has been very profitably applied to the main work of the Division.

SESSIONAL PAPER No. 16

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

THE SEASON.

The "freeze up" for the winter of 1916-17 came on December 11. The first part of the winter was mild, up to January 20, when a period of stormy, cold, changeable weather set in, which lasted until the end of the first week in February. The remainder of February and the whole of March was fine. April was dull and cold, except for a few days after the thunderstorm of the 22nd, when land worked nicely, and wheat was sown. The weather continued backward through the greater part of May, so that seeding in general was late. Through June and July the weather conditions were very favourable for maximum plant growth; the first hay was cut on July 14, and the crop was an average one. There was an abundant rainfall in August, which greatly increased crop yields. September was very favourable for harvesting grain, and all crops yielded well except those injured by insects and fungous pests. There was a very heavy rainfall in October, which delayed fall ploughing. November was more favourable, and autumn work was well advanced throughout the province before the "freeze up." Winter set in early, with a heavy snowstorm on December 2, and sleighs went continuously from that time till the end of March. The winter as a whole was stormy, and transportation was badly blocked at different periods. The snowfall for the winter was excessive, being over 148 inches, and as there was very little frost in the ground, the moisture from this source has practically all soaked away.

METEOROLOGICAL RECORDS.

Months.	Temperature, Fahrenheit.					Precipitation.					Bright Sunshine.
	Maximum.		Minimum.		Mean.	Rainfall.		Snowfall.		Total.	
1917.	Date.	Deg.	Date.	Deg.	Deg.	Days.	In.	Days.	In.	Inches.	Hours.
April.....	23 & 24	57	1	24	37.199	9	3.36	2	1.02	3.46	96.8
May.....	25	60	2	28	41.257	20	3.52			3.52	121.3
June.....	19	81	1	37	60.266	13	2.54			2.54	179.9
July.....	26	85	2 & 7	50	65.564	15	1.92			1.92	186.2
August.....	20	88	22	49	68.209	13	4.93			4.93	227.9
September.....	27	76	26	39	56.033	8	1.71			1.71	246.5
October.....	4 & 31	69	8	32	48.758	18	7.02			7.02	136.9
November.....	23	56	29	13	33.249	10	3.06	7	10.00	4.06	73.5
December.....	9	45	13	- 7	19.79	3	0.49	13	51.55	5.64	46.2
1918.											
January.....	5	42	3	-11	15.379	5	2.41	10	15.00	3.91	111.9
February.....	26 & 27	45	2 & 6	-14	13.607	5	0.73	10	30.00	3.73	104.3
March.....	31	45	8	-12	19.951	1	0.68	12	41.00	4.78	139.9
Total annual..						120	32.37	54	148.57	47.22	1671.3

9 GEORGE V, A. 1919

LIVE STOCK.

Horses.—Darling of Taunton gave a very fine mare foal on May 13 and Nell, a grade mare, a nice filly on June 6. One mare and one foal were sold, and one mare purchased, so that on May 31, there were five draught mares, a pure-bred Clydesdale foal, two draught colts, an express horse, and a driving mare; these were all in excellent condition for the spring work.

Dairy Cattle.—The two Ayrshire cows gave an average of 7,500 pounds of milk, and dropped a calf each, previous to the time that they were disposed of in December. One calf and a yearling heifer were sold, leaving at present a two-year-old heifer and a bull calf.

Steers.—Twenty steers were selected out of a large drove of cattle and purchased from a dealer on October 15, at $8\frac{1}{4}$ cents per pound live weight. They were dehorned and put on good pasture which included a strip of rape, until November 1, when the experiments were started. The cost, plus pasturage, when weighed into their pens, was \$8.40 per hundredweight. The total weight of the five pens was 8 tons 920 pounds. Two steers in pen V, when tested with tuberculin, were classed as suspicious, and slaughtered December 22. There was a trace of the disease in a gland in one, and in connection with an internal tumor in the other. These two cattle had cost, November 1, \$133.56; their feed came to \$19.88. They were sold, under inspection, for \$147.42, the net loss being \$6.02. The weight of the twenty steers when sold after a sixteen-hour fast, was 10 tons 1,165 pounds; the gain of the eighteen steers being 2 tons 120 pounds in 133 days. The two steers had gained 125 pounds in fifty days. The average price realized at the auction was \$11.02 $\frac{3}{4}$ per hundredweight. The net profit on the twenty steers, after deducting the cost of feed at current market prices and the loss in connection with the two steers, was \$279.97. The following comparisons were made from the experimental work:—

Beef versus dairy steers—Gains and profits.—The weights of eight dairy type steers were compared with those of eight beef type steers. The dairy steers made an average gain on the same feed of $9\frac{3}{4}$ pounds each in the 133 days' test. The selling price of the dairy steers was \$10.62 per hundredweight, or 58 cents less per hundredweight than the selling price of the beef steers; so that the beef steers gave an average profit over the dairy steers of \$6.49 each.

Heavy Feeding of Roots Throughout Period Versus Gradually Decreasing the Roots Fed from Start to Finish.—Eight steers were fed 45 pounds of roots per steer per day throughout the period, and the returns compared with those from eight other steers that were fed 45 pounds of roots per steer per day in November, 35 pounds roots per day from December 1 to January 20, then 25 pounds per day until March 1, and only $22\frac{1}{2}$ pounds per steer per day for the last two weeks. The grain fed to all these steers was increased uniformly from 4 pounds per day up to 35 pounds per day. The steers that were fed continuously with the heavy ration of roots, namely, 45 pounds per steer per day, made an average gain of 11 pounds over the others. This increase cost \$2.99 per steer, or 27 cents per pound of extra gain.

Lambs.—Thirty lambs were purchased November 1 at 14 cents per pound live weight, after a long fast. They were allowed to run on good pasture until November 10, when they were weighed into pens for experiments with different roughages, for 124 days. They were sold at auction, March 14, 1918, in lots of 10, at $16\frac{1}{4}$ cents, 17 cents, and $17\frac{1}{2}$ cents per pound live weight. The average net profit per lamb was \$1.60, neglecting labour and manure.

SESSIONAL PAPER No. 16

POULTRY.

There is a well-equipped poultry plant for 220 hens at the Station. These are about equally divided between Single Comb White Leghorns and Barred Plymouth Rocks. A mammoth incubator has been ordered, and progressive work is planned to meet the growing needs of the province.

BEES.

One colony was kept; it was prevented from swarming, and produced 40 pounds of honey, which was sold at 16 cents per pound. The colony wintered fairly well.

FIELD CROPS.

Average yield per acre on the Experimental Farm rotations:—

Wheat: Four fields gave an average yield of 18 bushels and 42 pounds. The earliest sown escaped the "Wheat Scab" and "Glume Spot" better than the later seedings.

Barley: Two fields of barley averaged 35 bushels and 37 pounds per acre.

Hay: Twelve fields of hay averaged 2 tons and 953 pounds per acre.

Mangels: Three fields of mangels averaged 869 bushels and 28 pounds per acre.

Oats: Four fields of oats averaged 42 bushels and 32 pounds per acre.

Potatoes: Two fields of potatoes averaged 304 bushels and 6 pounds per acre.

Turnips: Twenty-four plots of turnips gave an average yield of 26 tons, 890 pounds per acre.

Twenty acres of mangels for stecklings were sown in July. These did much better than was expected. They were pitted in the exhibition buildings, and wintered with scarcely any loss. Two acres of turnips for stecklings were sown in the plum and cherry orchards. These gave a large yield, but owing to the presence of club root, there was some loss in the pits during the winter.

Co-operative Test of Oats.—A co-operative test with Banner and Victory oats was carried on with twelve farmers in the neighbourhood of the Station. The average yields of the plots were as follows:—

Banner..	47 bushels	33 pounds.
Victory..	47 "	28½ "

Field Cultural Experiments.—The cultural work was continued, and valuable data on this important work gathered.

CEREALS.

The leading strains of cereals were tested in duplicate plots of one-sixtieth acre each on an area that was specially prepared for this work. Among the eleven varieties of spring wheat, Huron is mentioned as the variety that seemed to resist fungus diseases to a greater extent than the other varieties. Banner oats is recommended for this province, and was second among twelve varieties. Charlottetown No. 80 barley has been a leader at this Station for years, and was second among the fifteen varieties of barley. Solo led among the four varieties of peas.

FORAGE CROPS.

Four varieties of corn ripened out of the seventeen varieties tested in 1917, Quebec Yellow being the most satisfactory of these for grain. Thirty-six varieties of turnips were tested, and among the older varieties Good Luck was near the head of the list. Giant Yellow Intermediate led the twenty varieties of mangels. The test of carrots was destroyed by the rust-fly. The Russian sugar beet gave the largest yield among the four varieties tested. The old grass and clover plots gave very good returns. Three additional acres were used to test further alfalfa and a large number of mixtures of grasses and clovers.

9 GEORGE V, A. 1919

HORTICULTURE.

Orchards.—The orchards made fair growth during the season. The crop was below the average. The orchards were sprayed regularly, and the fruit was clean.

Small Fruits.—Gooseberries, raspberries, and strawberries gave good crops of fruit. The currants were below the average, and very little fruit formed of the black varieties.

Lawns, Trees, Shrubs and Flowers.—The ornamental trees and shrubs on the Station greatly improve the appearance of the lawns and grounds. They have grown well, and were slightly rearranged to improve the effect. A quarter of an acre of the east lawn was sown down to wheat. The flowers, including the water lilies, were one of the greatest attractions to visitors.

Vegetables.—Cultural experiments and variety tests were continued with all the leading vegetables. Special mention is made of the beans, tomatoes, corn, and onions, which gave unusual returns, the season being very favourable for them.

ADDITIONAL LAND.

Thirty acres of land lying between the St. Peter's road and the Kensington road were leased, and 20 acres of mangel stecklings grown there in 1917. Five acres of land, at the corner of the Mount Edward and DeBlois roads, were leased for ten years with an option of purchase any time during the period. Six and a half acres of land at the corner of Kensington road and Spring lane were leased for three years.

BUILDINGS.

The Station buildings received a few minor repairs, no new buildings were erected, and all are in good condition.

FARMERS, AND SCHOOL CHILDREN'S PICNICS—VISITORS.

Demonstrations in spraying were arranged during the farmers' picnics and on August 28 every passenger car on the P.E.I. railroad was loaded to capacity with visitors for the Station. Demonstrations were also arranged in pottings and caring for plants, and on October 16 more than 1,500 school children visited the Station. The total number of visitors recorded during the year was 8,193.

EXHIBITIONS.

The setting of the Station display was entirely new in 1917. The colour scheme was white and gold. The very best location in the exhibition building at Charlottetown was secured. At Summerside, in co-operation with the Live Stock Branch, a large hall in the centre of the town was occupied, and notwithstanding the fact that the county exhibitions were held simultaneously, a good display was made at all. The Superintendent judged at the several exhibitions, at the school fairs at Mount Stewart, Bedeque, and Crapaud, and at the Provincial Seed Fair.

CONVENTIONS, ASSOCIATIONS AND CONFERENCES.

The Superintendent attended the various conventions and associations held during the year in the province, and gave addresses at most of them. He was appointed on the Provincial Fruit and Vegetables Committee of the Food Board, and was Director of the Soldiers of the Soil movement for Charlottetown. He attended the New Brunswick Potato Growers' Association at Woodstock, judging at their potato show.

SHORT COURSES AND AGRICULTURAL MEETINGS.

The Superintendent gave a course of lectures on field husbandry and on cereals at a series of short courses held during the winter at different centres throughout the province. He also addressed farmers' institutes, when requested, and gave lectures on horticultural subjects to the several short-course classes in domestic science. Instruction was given at the Station to the judges of the Standing Fields Competition.

SESSIONAL PAPER No. 16

SALE OF SEED GRAIN, AND DISTRIBUTION OF SEED POTATOES.

The best strains of registered seed were grown on multiplying fields on the rotations. These were sold to farmers, who made application, at current prices. Many have taken advantage of this opportunity to secure foundation stock for their farms. Charlottetown No. 80 barley continued to be the most popular seed grain, and orders were received for many times the available supply. In all, sixteen lots of pure seed wheat, 12 lots of oats, 39 lots of barley, and 2 lots of mangel seed were sold to farmers in the spring of 1917. One hundred and thirty-six samples of potatoes were sent out, and 93 samples of flower seeds and bulbs were sent to schools, women's institutes, and others. The demand for these has increased rapidly.

EXPERIMENTAL STATION, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. SAXBY BLAIR.

THE SEASON.

April, 1917, was a cold month, with a very heavy precipitation, particularly during the first part of the month. It amounted to 4.12 inches, and as a consequence, very little land could be worked. On a naturally well-drained area at the Station, some roots for seed were planted on 25th and 26th April. During May the temperature continued much below the average, with three frosts, the last being on the 12th. The rainfall of 2.92 inches fell on sixteen days during the month, with the result that all except naturally well-drained lands were unfit to work at any time during the month. The amount of sunshine was much less than normal, and there were few good drying days. The low temperature, continuous rainfall, and lack of sunshine seriously hampered the work of putting in crops, and retarded vegetation generally. The early part of June continued wet, with rain on eight days up to the 13th, after which there was some good weather for putting in crops. The temperature was slightly above that of other years, resulting in a rapid growth of all crops which had been put in. Cropping was late, however, owing to the unfavourable weather, and a large part of the seeding was done during June. Growth, particularly of fruit trees, was retarded by the cold weather, and apple trees, usually in bloom the last of May, were fully ten days later, not being in full bloom until the 14th of June.

The latter part of May and early June, due to the continuous wet weather, was unfavourable for spraying, thus preventing, in many cases, the giving of the necessary early sprays for scab control.

During July conditions were favourable for growth except on very wet land, there being ample rainfall for dry lands, and too much for the low areas which previously had not properly dried out. The wet weather favoured the hay, and a fair to good crop resulted. There was an unusually heavy rainfall on the 28th of 2.12 inches. This was followed by more wet weather during August, the rainfall aggregating 5.15 inches for the month, and many wet areas remained watersoaked for the balance of the season. There was a violent windstorm on the 10th which caused grain to lodge, and did much damage to potatoes and corn. The fruit crop was also greatly reduced, it being estimated that 30 per cent was blown from the trees.

September was generally fine, and early seeded grain produced good yields and was harvested in good condition. Late-seeded grains and potatoes were injured by a heavy frost on September 10, which lessened the average yield very materially.

October was a satisfactory month for fruits, and other crops were harvested in good condition. There was a very heavy precipitation from the 20th to the 25th, 6.77 inches of rain having fallen during this period, causing floods equal to the spring freshets. These excessive rains, with the ground already wet from previous rains, made much fall ploughing impossible, and rendered the gathering of roots a very difficult task.

November was fine but cold, and there were many heavy frosts during the month, but it was possible to plough until the 26th, after which the ground remained frozen.

December was a cold month throughout, the lowest temperature being 7 below zero. A fall of snow on the 2nd made good sleighing, and this continued during the winter. January was cold throughout, without the usual "January thaw". The snowfall was not great, but the small amount that did fall remained, making good sleighing. February was unusually severe, the thermometer registering below zero on ten days during the month, the lowest being 13 degrees. The snow remained until the 26th, when a thaw broke up sleighing in many places. March has also been unusually cold, and a fall of snow early in the month made good sleighing, which continued to the 27th. The only heavy snowstorm of the winter, accompanied by wind, was on the 10th, when considerable drifting resulted. A remarkable feature of the winter was that sleighing continued practically uninterrupted from December 2 to March 27, there being no mild spells of long duration during that time.

METEOROLOGICAL RECORDS.

Months.	Temperature.					Precipitation.					Hours of bright Sunshine.
	Maximum.		Minimum.		Mean.	Rainfall.		Snowfall.		Total.	
1917.	Date.	Deg.	Date.	Deg.	Deg.	Days.	In.	Days.	In.	In. in rainfall.	Hours.
April.....	23	62	1-2	22	38.4	13	4.09	3	3	4.39	107.6
May.....	24	63	8-12	30	43.63	16	2.92	.....	.....	2.92	101.7
June.....	15-21	81	1	34	60.36	11	2.93	.....	.....	2.93	176.3
July.....	26	87	29	46	65.93	12	3.65	.....	.....	3.65	195.6
August.....	2	87	10	42	67.67	11	5.15	.....	.....	5.15	202.1
September.....	27	78	12	31	53.94	8	3.72	.....	.....	3.72	214.7
October.....	30	76	15-27	29	48.69	12	8.54	.....	.....	8.54	157.9
November.....	24	55	30	10	33.01	6	2.51	4	4.25	2.935	78.1
December.....	9	51	17	- 7	19.66	4	1.47	8	30.25	4.49	33.5
1918.											
January.....	12	43	1-28	- 5	18.16	5	1.23	6	9.50	2.18	81.6
February.....	26	52	9	-13	17.49	5	2.27	6	11.75	3.445	103.3
March.....	31	52	8	-13	24.44	2	0.37	8	18	2.17	149.9
Total Annual.....	.....	.....	.....	.....	.....	.....	38.85	.....	76.75	46.52	1602.3

LIVE STOCK.

Horses.—In addition to the seven draught, one express, and one driving horse reported on last year, a pair of draught horses were purchased in October. This purchase was made necessary because of the additional work resulting from growing turnip stecklings for seed. No feeding experiments have been conducted with horses during the year. A record has been kept, however, of the feeds used, and, during the eight months of heavy work, the grain fed consisted entirely of whole oats, and an average of 18 pounds per day was fed to each horse, with 12 pounds of hay. The oats cost 90 cents per bushel and the hay \$12 per ton, making a daily cost of 55.8 cents per horse. The average weight of the draught horses is 1,370 pounds, and even with the above feed, they weighed lighter in the fall after work was finished than in the spring when work started. The winter ration consisted of 13.8 pounds of oats, 12 pounds of hay, and 6.4 pounds of carrots, costing 45.4 cents per day.

Cattle.—The registered Shorthorn stock on hand at the end of the year consisted of 1 herd bull, 14 cows, 2 two-year-old heifers, 6 yearling heifers, 6 heifer calves, and 3 bull calves, making a total of 32 head. Six bulls were sold during the year for breeding purposes. Six cows have qualified in the Record of Performance test. Fourteen cows have completed lactation periods during the year; of these 9 were

SESSIONAL PAPER No. 16

mature cows, 2 were three-year-olds and 3 were two-year-olds. The average milk yield for the herd was 6126.9 pounds, testing 4.14 per cent fat, making an average butter yield per cow of 299.17 pounds, and giving an average profit of \$49.53 per cow. The milking days averaged 323 for the herd. The daily average per cow was 18.96 pounds of milk.

The average for the twenty-four lactation periods of the Shorthorn cows and heifers at this Station has been as follows: Number of days dry, 72; number of days milking, 304; yield of milk per cow for lactation period, 5,627 pounds; average yield per cow per day, 18½ pounds; pounds of butter produced in each lactation period, 272; value of butter and skim-milk for each lactation period, \$110.42; cost of feed from calving to calving, \$74.79; profit per cow for period, \$35.63.

During the stable-fed period, 1 pound of meal mixture is fed to each 3 pounds of milk produced, and while on pasture 1 pound of meal is fed for each 4 pounds of milk produced. It should be pointed out that the pasturage is limited, and at no time would be considered really good. For grain mixtures, 300 pounds of bran, 200 pounds of ground oats, 200 pounds of cottonseed, and 100 pounds of oilmeal were used for part of the year, but, owing to scarcity of oats, the meal mixture was changed to 300 pounds bran, 100 pounds cottonseed, and 100 pounds oilmeal, which mixture has given satisfactory results.

Steers.—Twenty-six steers bought in the fall of 1916 and sold on the 31st March, 14th and 26th May, 1917, returned the following profit:—

Purchase price, 23,077 pounds at 6½ cents.. . . .	\$1,500 00
March 31, sold 2 steers 2,320 pounds at 9 cents.. . . .	\$ 208 80
May 14 and 28, sold 24 steers 28,546 pounds at 11 cents.. . . .	3,140 06
	<hr/>
	\$3,348 86
Purchase price, 23,077 pounds at 6½ cents.. . . .	1,500 00
	<hr/>
Selling price above cost.. . . .	\$1,848 86
Cost of feed for period.. . . .	1,102 94
	<hr/>
Profit from lot.. . . .	\$ 745 92
	<hr/>
Average weight of steers when sold.	1,187 pounds.
Average weight of steers when bought.. . . .	887 "
	<hr/>
Average gain in weight of steers.. . . .	300 "
	<hr/>

Thirty-one steers were bought from farmers in the surrounding districts in October, 1917, and fed during the winter. Two lots of twelve each were fed alike in every respect except that the succulent feed of one lot was turnips and the other was corn ensilage. The meal ration was started at 1 pound and increased to 5 pounds each per day at the end of the third week, making an average of 4.82 pounds per day per steer for the whole feeding period. Turnips were fed at the rate of 45 pounds, and ensilage 35 pounds each per day. Hay was fed to the amount of 12 pounds for each steer. The meal mixture was made up of 400 pounds bran, 200 pounds cottonseed, and 100 pounds of oil meal to February 1, after which the cottonseed was increased 100 pounds. The roots were valued at \$3, ensilage \$4, and hay \$12 per ton. The meal mixture cost \$2.41 per hundredweight.

9 GEORGE V, A. 1919

The steers could have been sold at 10 cents per pound live weight on March 31 at the end of the feeding period, and at this valuation the following profits would have resulted:—

	Turnip lot.	Ensilage lot.
First weight, November 28, 1917.. . . . lb.	10,540	10,540
Finished weight, March 31, 1918.. . . . "	13,255	13,025
Average gain per steer.. . . . "	226.25	207.08
Daily gain per steer.. . . . "	1.839	1.725
Total cost of feed for period.. . . . \$	379 06	382 78
Selling price, March 31, 1918, at \$10 per cwt.. . . "	1,325 50	1,302 50
Total cost, March 31, 1918.. . . . "	1,195 91	1,199 63
Profit per lot.. . . . "	129 59	102 87

POULTRY.

The poultry department consists of two permanent 100-hen houses, 16 by 32 feet each, seven colony houses 8 by 12 feet each, two brooder houses, one duck house, and a supply house, with an incubator room in the basement. There are three incubators, including the Prairie State, Tamlin, and Cyphers.

Three breeds have been kept during the past year, consisting of 107 female and 9 male Barred Plymouth Rock, 84 female and 7 male White Wyandotte, and 115 female and 10 male Rhode Island Red, making a total of 206 female and 26 male birds.

The feed used consisted of oats, corn, and wheat screenings, which was fed at the rate of 3 quarts to each 25 hens per day. A dry mash consisting of 3 parts bran, 3 parts of ground oats, and one part of meat scrap was before them in hoppers all the time. The green feed was composed principally of mangels.

BEES.

The eight colonies of bees carried through the winter were found to be in fair condition in the spring. The spring was unusually late, however, and the fruit-bloom period was dark and unfavourable, resulting in a small amount of honey being gathered at that time. On the whole, the season was unfavourable for honey production, owing to the much dark weather prevailing. The colonies were prevented from swarming by weekly examinations, and the removal of queen cells. The greatest yield from a single colony was 116 pounds, and from the poorest colony 13 pounds, the average being 55.3 pounds. Black bees only have been kept, and, during the summer three Italian queens were purchased from J. P. Moore, Morgan, Kentucky. These were introduced into hives where the black queens were not prolific. One of these queens proved of no value, making it necessary to unite this colony with one of the other weak ones, thus reducing the number of colonies to seven. The colonies on the average weighed 68 pounds when put in their winter cases on November 3.

FIELD HUSBANDRY.

Owing to the limited area for field crops, and the fields available being taken up quite largely with various other experiments, it has not been found possible to devote certain fields to definite crop rotations. It should be stated, however, that the practice of following clover with a hoed crop such as corn, turnips or potatoes, and this followed by grain and seeding down to clover has been followed in all the fertilizer and other cultural tests. This three-year rotation seems to be the most satisfactory for the land at this Station.

Crop Yields.—The corn put into the silo amounted to 162 tons, the greater part of which was the variety Longfellow, which from tests here would seem to be the best variety to grow to obtain fair yields of well-matured corn. The corn did not mature as well as usual, owing to being planted late and the growth being checked by the wet weather. As a result, the ensilage was not as good as was desired. The yield per acre averaged 11 tons 745 pounds. The turnips were a very inferior crop owing to the area

SESSIONAL PAPER No. 16

on which they were planted being too wet and in low fertility. The yield from 5 acres was only 1,785 bushels, an average of 357.7 bushels per acre. This was newly broken land which had previously been in oats, and was very uneven. An area of Banner oats seeded May 21 on an area previously in corn and turnips, yielded 42 bushels and 15 pounds per acre. Areas seeded on new land in low fertility and very wet yielded only 18 bushels and 22 pounds per acre. The total grain yield was 601 bushels. The hay crop on the dyked area of 7 acres was good, having an excellent stand of clover averaging 3 tons 1,596 pounds cured clover hay per acre. The 8 acres on the upper field areas were inferior, producing an average of 2 tons 90 pounds per acre. The total hay yield was 47 tons 1,837 pounds.

FERTILIZER EXPERIMENTS.

The area given over to fertilizer experiments and experiments with pulverized limestone aggregates 22½ acres. Four acres are devoted to an experiment conducted by the Division of Chemistry designed to determine the most profitable quantity of fertilizing materials to use per acre. One and one-half acres are devoted to a test to gain information as to the crop production from different fertilizing materials on land limed and unlimed. Five acres are devoted to an orchard fertilizer test. One acre is employed to test the value of ground dried seaweed as a source of potash, and one acre to test the value of Rito or humatized peat in crop production. In addition to the above, 10 acres are divided into ½-acre plots on which the relative value of slag and pulverized limestone is being determined.

CEREALS.

Experiments with cereals during the year consisted of 1 acre each of Marquis and Red Fife wheat, 1 acre No. 80 barley, and one-half acre each of Canadian Thorpe and Manchurian barley, and an acre each of Banner, Victory, and Daubeney oats. One-quarter acre of Golden Vine and one-half acre of Arthur peas were also grown. The yield of wheat averaged 14 bushels per acre, there being only a difference of 34 pounds in yield between the two varieties. The oats yielded an average of 38 bushels, Banner giving the highest yield. The Daubeney is very early, but otherwise is not desirable. Victory is a very plump oat, and has given returns nearly as good as Banner. Barley has never yielded high at this Station, and, of the three tested, the No. 80 obtained from the Experimental Station at Charlottetown is the most satisfactory. The average yield was 19 bushels per acre. The best field pea is the Arthur, which yielded 26 bushels per acre.

FORAGE PLANTS.

The root plots were grown on an area in a fair state of fertility, the previous crop being clover. The ground was manured the previous fall with 15 tons stable manure per acre and 800 pounds of fertilizer containing 4 per cent of nitrogen and 10 per cent of phosphoric acid, applied after the ground was disced in the spring and harrowed in. The mangels and carrots were seeded May 12, and the turnips May 17. Thirty-three varieties of swede turnips were grown, and they ranged in yield from 1,496 bushels per acre to 712 bushels. Good Luck and Kangaroo, two standard varieties, quite extensively grown in this district, yielded 1,320 and 1,170 bushels, respectively. Five varieties of fall turnips were also grown, of which the White Globe was the most productive, yielding 994 bushels per acre.

Sixteen varieties of mangels were tested and they ranged in yield from 811 bushels per acre to 349. Gate Post, a long, red variety, was the most productive. The Yellow Intermediate, considered one of the best from tests covering a period of years, yielded 759 bushels. The Danish Sludstrup, which has been one of the best yielders here, was not as good as usual and produced only 627 bushels per acre.

Three varieties of sugar beets yielded an average of 477 bushels per acre. An analysis of these would seem to show that they contain an average amount of sugar.

9 GEORGE V, A. 1919

Eleven varieties of carrots ranged from 765 bushels to 441 bushels per acre, the Improved Short White giving the largest yield.

The test with ensilage corn was conducted on a suitable corn area of light loam. The crop was grown in hills $3\frac{1}{2}$ feet apart, a small amount of manure being put under each hill. The yield ranged from 17 tons 1,224 pounds to 10 tons 757 pounds per acre. Early Leaming was the best yielder, followed by Longfellow which produced 17 tons 1098 pounds per acre. The Longfellow matures much earlier than Early Leaming. Golden Glow, a very satisfactory variety, produced 14 tons 934 pounds per acre.

SEED PRODUCTION.

A small area of one-seventeenth acre was planted to Danish Sludstrup mangels grown the previous season. The seed yield was 1,686.7 pounds per acre. The quality of the seed was not as good as that grown in 1916. One-sixth acre of Corning's Lapland turnips yielded 1,108.4 pounds seed per acre. Forty-five acres of land were prepared early in July and seeded to turnips, the stecklings being carried over the winter in pits for planting in the spring of 1918.

HORTICULTURE.

While the area in orchard fruits aggregates 46.7 acres, this is not devoted to orchard only, for, except a strip 4 feet wide at each side of the rows of trees, the land is devoted to field crops. The same system of rotation, namely, clover, hoed crop, and grain is followed on these areas as is practised on the other parts of the farm. During the past season corn, roots, potatoes and beans were grown in a part of the orchard, and the rest was in clover and grass. Following this system, there is no expense in the development of an orchard, except the loss of land which is necessary in keeping the strip 8 feet wide along the trees cultivated.

The orchard trees have for the most part made vigorous growth, particularly the apples and cherries. The plum trees have not done as well as desirable, and so far have produced only a few plums. The peaches kill back more or less every winter, and have made inferior growth. Some trees have borne a few peaches, and, of the varieties fruiting, Mayflower seems to be the most promising. The varieties Wagner, Wealthy, Yellow Transparent, and Cox's Orange apple trees, five years planted, have fruited some this season.

The experimental orchard work has been continued at Berwick, Kings County; Bridgetown, Annapolis county; and Falmouth, Hants county. This work has made it possible to test out different spraying materials and methods of application at these three points, thus gaining valuable information. The results would seem to show that the lime-sulphur spray with arsenate of lead makes a good combined fungicide and insecticide, giving as little foliage injury as any of the sprays tried. One gallon of the concentrated commercial lime-sulphur to 45 gallons of water and 5 pounds of paste arsenate of lead to 100 gallons has been satisfactory for keeping apple scab and insects under control.

The experimental work with vegetables has been continued and some satisfactory data secured. Potatoes were an exceptionally good crop, this being due largely to the ground being a good clover sod which gives ideal conditions for this crop. One acre of Green Mountain, a main crop variety, yielded 325 bushels per acre. An area of Irish Cobbler, an early potato, yielded 388 bushels per acre. The test made with different varieties yielded from 398 bushels per acre as the highest, to 114 bushels as the lowest. The average yield was 237 bushels marketable potatoes per acre. Tests were continued with different strains of a variety, using Green Mountain, Irish Cobbler, and Garnet Chili. Many cultural experiments were also conducted.

The lawns, shrubs, trees, and flowering plants are each year becoming more attractive, and the past season being damp, the lawns remained green throughout the summer and did not dry out as is usually the case owing to the sandy nature of the soil.

SESSIONAL PAPER No. 16

FARM IMPROVEMENTS.

Buildings.—Very little addition was made to the buildings during the year. In order to house some of the young stock, owing to shortage in barn space it was necessary to put up a building 40 feet long by 20 feet wide, adjoining the steer barn. This was a shed-roof building 12 feet high in front and 8 feet at the back, the feed being taken in trucks from the steer barn. The inside of the poultry building was sheathed, a living room for the poultryman fitted up, and improvements made in the incubator room.

Clearing Land.—No additional land has been cleared during the past year, and little work has been done toward improving roads or underdraining.

EXHIBITIONS.

An exhibit of farm produce was made at Halifax, Bridgewater, and Yarmouth. The attendance at these exhibitions was large, and much interest was shown in the work carried on by the Station.

AGRICULTURAL MEETINGS.

In addition to addressing meetings of the provincial organizations and agricultural short courses, a series of meetings in the interest of greater production was held in the valley counties during the winter. In addition, many meetings were held in various parts of the province, and the whole took up the greater part of the winter months.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

THE SEASON.

The early part of the winter of 1916-17 was not at all typical of winter weather, there being no great snowfall until the 3rd of February. On the 14th of February the thermometer dropped to 24° and the weather remained very severe for several days. Snow lay on the ground throughout March. During this month two of the heaviest snow storms recorded in the past five or ten years were experienced. The last three days of the month were much milder, and the snow settled rapidly. April was a very changeable month, varying from bright, spring-like to cold winter days. A thunder-storm was recorded on the 21st.

The weather continued unsettled throughout May. From the 10th to the 30th rain was recorded on fourteen different days. Seeding commenced on the 30th of May, being thus long retarded by the dull rainy period. June was also cold and backward. The growth of vegetation was very slow until the 12th, after which time it came on rapidly. Potatoes and roots were planted about the 16th. July was exceptionally fine. A temperature of 85° was recorded on the 18th. August was somewhat unsettled. September was an excellent month for the harvesting of all crops, grain and corn being stored in first-class condition. October and November were unsettled. High tides, with heavy winds, prevailed on the 1st of October; dykes were washed away and marshes flooded. During the latter half of October a heavy precipitation was recorded. Two inches of snow fell on the 27th of November. This made the harvesting of roots very difficult and very little fall ploughing was accomplished. December was very severe, with heavy snowfalls. Typical winter weather continued throughout January and February, and a great depth of snow covered the ground. Cold, stormy weather was experienced during the first part of March, but towards the end it became very spring-like.

METEOROLOGICAL RECORDS.

Month.	Temperature.		Precipitation.			Total Sunshine.
	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	
1917.	Deg.	Deg.	Inches.	Inches.	Inches.	Hours.
April.....	59	20	3.23	2.00	3.43	104.90
May.....	57	28	3.55	.....	3.55	97.30
June.....	82	32	2.72	.....	2.72	120.70
July.....	85	35	1.38	.....	1.38	192.70
August.....	84	47	5.15	.....	5.15	204.60
September.....	78	29	0.90	.....	0.90	198.50
October.....	69	29	8.05	.....	8.05	147.00
November.....	58	3	3.51	2.00	3.71	90.90
December.....	49	-16	0.50	39.00	4.40	64.30
1918.						
January.....	39	-18	0.81	15.00	2.31	96.00
February.....	50	-23	1.82	12.00	3.02	88.90
March.....	49	-18	0.25	23.00	2.55	140.80
Total for the year.....	.....	.....	31.87	93.00	41.17	1,546.60

LIVE STOCK.

Horses.—Fourteen horses are kept on the Nappan Farm at present; these include ten heavy draught horses of which four are pure-bred Clydesdale mares. Only one was bred, namely, Fancy Lass (Imp) (31537) (34423). She dropped a nice filly on May 20, 1917. There are three lighter horses suitable for express, cultivating, light harrowing, etc. Data on the cost of feeding horses, also raising colts are being compiled.

Dairy Cattle.—The “Grade-up” experiment has now completed its sixth year. The object of this work is to show the value of a pure-bred sire from high producing dams and sires on the average dairy stock of the country. It is interesting to note as the experiment progresses that the results in most cases are satisfactory, but sufficient date have not yet been compiled from which to draw definite conclusions. The percentage of heifers dropped in the spring of 1918 was much greater than any previous year, which will facilitate the work very much. One of the most outstanding features brought out in the experiment is the necessity of judicious as well as liberal feeding of dairy cattle in order to realize the greatest profit from same.

Sheep.—Two flocks of sheep are kept at Nappan, consisting of a flock of pure-bred Shropshires and a grade flock of Leicester ewes with some Shropshire blood. The Shropshire flock is made up of eighteen ewes and ten shearling ewes, four pure-bred Shropshire flock is made up of eighteen ewes and ten shearling ewes, and four pure-bred ewes. The lamb crop for the spring of 1917 was very satisfactory, and at the time of writing the crop for the spring of 1918 is about 120 per cent. All ram lambs from the pure-bred flock will be sold for breeders. The object of the grade flock is to experiment in the value of a pure-bred sire on common grade stock in grading up a flock of profitable sheep.

Swine.—Two breeds are kept at Nappan, namely, Berkshires and Yorkshires, the total on hand March 31, 1918, being four Berkshire sows and two boars, eight Yorkshire sows and one boar. Only fair returns were realized from these during the year. As for the previous year, the Yorkshires gave the more satisfactory returns.

The herd of ten grade sows purchased in March, 1917, gave good returns and proved good mothers. At the time of writing they are proving much better as two-year-olds than as yearlings.

SESSIONAL PAPER No. 16

Some thirty-odd young pigs from the grade sows were fed during the season, part with self-feeders and part hand-fed; also two lots on different feed mixtures, but the results are only from one year, and therefore are not sufficient to draw any conclusions from. This may be said, however, that those fed with the self-feeder did somewhat better than those fed by hand, but they consumed considerably more feed. This work will be carried on for two or three years at which time more definite results can be given.

POULTRY.

Only fair results were obtained from the poultry during the season. The spring of 1918 has been somewhat better for early hatches than was that of 1917 and up to the time of writing the hatches have been good, but with only fair returns from the chicks put under brooders.

Four breeds are kept at Nappan, namely, Barred Rocks, White Wyandottes, Rhode Island Reds, and White Leghorns. The number of each kept through the winter months was as follows: Rock hens 54; Rock pullets 53; Wyandotte pullets 7; Rhode Island Red pullets 20; White Leghorn hens 52; White Leghorn pullets 51; Males: Rocks 9; Wyandottes 1; Rhode Island Reds 1; and Leghorns 7.

Six incubators were used during the spring, namely, three Prairie State; two Nonpareil, and one Cyphers. The first hatch came off on March 16. The percentage of fertile eggs and chicks hatched per breed were as follows: Barred Rocks 78.9, and 36.2, Wyandottes 88.8 and 40.8, Rhode Island Reds 56.4 and 28.8, White Leghorns 85.9 and 42.5 per cent, respectively.

In testing for winter egg production it was found this winter that the old hens, especially in the case of Rocks, did somewhat better than the pullets. Possibly this can be accounted for by the very severe winter.

BEES.

The past season, so far as weather conditions and pasturage were concerned, was a very poor and unsatisfactory one for apiary work. Until May 25 the weather was most unfavourable, being very damp and cold. Bees did not get more than one or two flights per week. The brood in the brood chamber got slightly chilled. From that until the 20th of June conditions were slightly better and after that date some very suitable weather was experienced.

Fifteen hives were put in the cellar the previous fall. Three died during the winter; consequently, only twelve were put on stands for the summer. Five new hives were added to the apiary, making a total of seventeen good, strong colonies for the summer.

The seventeen colonies produced, in extracted honey, 824 pounds during the season, or an average per colony of 48.47 pounds. The largest yield for one colony for the season was 97 pounds.

Counting loss, cost of sugar fed, etc., the average value of the production for the season, per colony, spring count, was \$7.67. The experiment of wintering bees on different stores and under different conditions was continued as in previous years, namely, fifteen colonies were put in the cellar of the Superintendent's house. These were divided into five groups of three each, and fed as follows: (1) all sugar syrup; (2) half sugar syrup, half clover; (3) half sugar syrup, half golden rod; (4) all clover; (5) all golden rod. Group 6 was left out of doors, and banked well with snow. This group, which was fed on half sugar and half fall honey, showed the least dysentery of all. Only one colony was lost, and that from group 6. Group 1 in cellar on all sugar came through the winter in the best condition, and was possibly the strongest of all.

9 GEORGE V, A. 1919

FIELD HUSBANDRY.

Rotations.—Three rotations are being operated at the Nappan Farm, namely:—

Rotation "B" (five years): First year roots, or corn; second year, grain seeded down; third year, clover hay, fall ploughed; fourth year, grain, seeded down; fifth year, clover hay, ploughed in autumn.

Rotation "C" (four years): First year, roots or corn; second year, grain, seeded down; third year, clover hay; fourth year, pasture, fall ploughed.

Rotation "D" (three years): First year, roots or corn; second year, grain, seeded down; third year, clover hay, ploughed in autumn.

Rotations "B" or "D" are most suitable where plenty of rough pasture is available. "C" is an excellent rotation for a dairy farmer or any one keeping a large herd with insufficient pasturage.

Crop yields.—The total area in grain, including test plots was 45.88 acres, of which there were 3.38 acres in wheat, 3 acres in barley, 4 acres in mixed grain, 5½ acres in buckwheat and 30 acres in oats. The average yield of these was: 24 bushels 28 pounds; 15 bushels 39 pounds; 25 bushels 36 pounds; 21 bushels 5 pounds, per acre; and in oats the 13 acres in rotations yielded an average of 40 bushels 28 pounds. The 17 acres new land, first crop, yielded 15 bushels 6 pounds. The wet season was very unfavourable for barley; consequently, it was nearly a total failure. There were also 10 acres sown to green feed for dairy cattle.

In roots and potatoes there were 15 acres, 13½ in turnips and 1½ in potatoes. The average yield per acre was 885 bushels 8 pounds and 288 bushels 8 pounds, respectively.

Five acres of ensilage corn yielded 86 tons 1,429 pounds or an average of 17 tons 285 pounds.

Hay on upland, of which there was 31 acres, yielded an average of 1 ton 1,603 pounds per acre. Fifty acres of marsh yielded an average of 1 ton 883 pounds hay per acre.

FERTILIZER EXPERIMENTS.

A comparison is being made among plots receiving one and two fertilizing elements and complete mixtures in order to ascertain the quantity and proportionate composition of the most suitable fertilizer, which will also give the greatest profits. Experiments are also being carried on with ground limestone with different quantities per acre, and while there are yet only one year's results to draw conclusions from it may be said that the effect which ground limestone has on the catch of clover the first year is most marked. The application ran from 1 to 5 tons per acre.

CEREALS.

Thirteen varieties of spring wheat were tested in duplicate plots of one-sixtieth of an acre each, the highest yield being obtained from White Fife, 29 bushels 30 pounds per acre; and the lowest from Bishop, 18 bushels per acre.

In barley there were twelve varieties tested in duplicate plots, but the birds injured the plots so badly that the crop was not worth harvesting.

Fifteen varieties of oats were tested in duplicate plots, the same as the wheat. The highest yield obtained was from Pioneer, 50 bushels 17 pounds; the lowest from Daubeney, 28 bushels 17 pounds.

Five varieties of buckwheat were tried, the best returns being obtained from Rye, 27 bushels 38 pounds. Japanese yielded the lowest, 21 bushels 42 pounds.

In the six varieties of peas, Solo gave the highest yield, it being 15 bushels 30 pounds. English Grey gave the poorest yield, 11 bushels 30 pounds.

Field Crops of Grain.—The barley was very poor. The wet, cold, backward spring made the crop nearly a failure at Nappan. The yields ranged from 12 bushels 24

SESSIONAL PAPER No. 16

pounds to 19 bushels, French Chevalier doing the best. Wheat filled only fairly, Huron being much superior to either Red Fife or Marquis. They ranged in yield from 16 bushels 30 pounds for Marquis to 23 bushels 30 pounds for Red Fife. Huron yielded 18 bushels. All oats filled very light. They ranged in yield from 39 bushels for Ligowo to 46 bushels 17 pounds for Banner. Only the wheat and oats were cleaned by fanning mill and hand-picked to sell, in limited quantities, for seed purposes to farmers.

FORAGE PLANTS.

Thirteen varieties of Indian corn were sown on June 14 in duplicate test plots of one hundredth of an acre each. The highest yield came from Compton's Early, averaging 21 tons 1,100 pounds. The lowest yielder was King Philip, 10 tons 1,750 pounds. This year Longfellow, which has for the past five years given an average yield of 14 tons 1,559 pounds per acre, could not be obtained. Hence Compton's Early was sown as the field crop, and the average yield per acre was 17 tons 218 pounds.

Out of thirty-six varieties of turnips, which were tested in duplicate plots the same as the corn, the highest yielder was MacDonald's Perfecta, 1,090 bushels per acre. The lowest was Carter's Imperial, 640 bushels per acre.

The season was very late for mangels; therefore, the yields are not very high. Swiss Charm gave the best returns, yielding 880 bushels per acre, with Golden Tankard at the bottom with only 391 bushels per acre.

Seven varieties of carrots were tried, the highest producer being Improved Short White, 535 bushels per acre. The lowest was Giant White Vosges, yielding 295 bushels per acre or 7 tons 750 pounds.

Only three varieties of sugar beets were tested, and the largest producer was Italian sugar beet, 370 bushels or 9 tons 100 pounds per acre. Home Grown Seed was the lowest, 339 bushels or 8 tons 950 pounds per acre.

Some 20 acres were sown to turnips for stecklings, as experiments of previous years have demonstrated that good root seed could be grown in this district. However, the season was very late and the land was not all cleared consequently, the date of sowing was not until very late, the 1st of August. Notwithstanding these facts the stecklings grew nicely. Some reached four to five inches in diameter, but the majority were only one to two inches. The backward fall made the harvesting of them very difficult, and as severe frosts set in very early the most of them were caught in small piles in the field, just as they had been pulled and piled to sweat before pitting. Though the winter was most favourable for them in this condition they did not keep very well, but sufficient to plant 16 acres for seed production was saved. These will be planted as soon as the ground is at all fit.

All the Grimm alfalfa sown June 16, 1916, was winter-killed the second winter. Seventy-five per cent went the first winter. It would appear that the thawing and freezing in the early spring has a great deal to do with winter-killing of alfalfa in this district.

HORTICULTURE.

Fruits.—Large fruits, especially the apple crop, were not as good as for previous years, but the quality was somewhat better. Very little scab was in evidence. The most troublesome insect pest was the Canker worm. This holds equally true throughout the surrounding district. In many orchards where they had not spraying appliances the foliage was destroyed throughout the whole orchard, much loss being sustained thereby. The winter varieties at Nappan were much better than the fall varieties. Frost during the early blooming period would account for a decrease in the crop yield. This affected the early varieties much more than the later ones.

Strawberries.—The strawberries wintered well and made very strong growth after mulch was removed and kept up quite late. Hence blossoming was retarded somewhat, no injury was realized from the late June frosts and a good yield was the result.

9 GEORGE V, A. 1919

Bush fruits.—These came through the winter in good condition, with the exception of gooseberries, which killed out badly. The frost seemed to heave them out and bare the roots. Raspberries did exceptionally well; also currants. All these are new plantations and some valuable data may now be gotten from their yields.

Shrubs.—All shrubs on lawn came through the winter of 1917 in splendid shape, and made a strong growth during the season, but during the winter of 1918 the heavy fall of snow did much damage to all trees and shrubs, in that many were badly broken down and the trees split. It also spoiled the appearance of many of the nice hedges.

Perennials.—The perennials wintered and made strong growth during the season.

Annuals.—The majority of the annuals were started in hotbeds between the 4th and 10th of April, but owing to the unfavourable weather conditions for hotbed work, the weather being very cold and wet with very little sunshine for weeks at a time, the germination and growth were only fair, and much damping off was experienced. However, those that survived and were planted in the open made splendid growth, and these, with the perennials, gave a most profuse bloom in the border from early spring to late summer.

Garden.—The season was anything but favourable for early gardening, especially on the heavier soil. It was after the middle of May before the land was in a condition to work at all. Even after the seeds were sown, germination was very slow, as the ground was very cold. Therefore only fair returns were realized.

Besides the cultural garden work and testing of varieties, the work of endeavouring to improve the strain of a few of the best varieties of potatoes was continued as in the previous season. The varieties used in this work are Irish Cobbler, Carmen No. 1, Wee McGregor, Empire State, Rawling's Kidney, and Green Mountain. The results from this work are very encouraging, as a marked improvement, not only in yield but in quality, is being noticed between the selected and unselected.

FARM IMPROVEMENTS.

Buildings.—A new model piggery, suitable for the average sized farm, was started late in the season, but owing to unfavourable weather conditions and the early frosts the inside was not completed, but will be completed next season.

The building is 30 x 68 feet, with a good cement foundation all around, averaging 12 inches thick and 3 feet high. It has plank frame with a straw loft and feed storage room overhead; single boarded and 2-inch battens over cracks. On the inside on studs there is one ply of half-inch boards on which is placed one ply of linofelt paper covered with $\frac{7}{8}$ sheathing. The ceiling is sheathed. The floor will be made of No. 1 Portland cement, with drainage from each pen leading out into one manure pit. In the main part there are ten pens 10 feet 10 inches by 10 feet. The partitions are made of 1 $\frac{3}{4}$ -inch finished lumber, 3 feet high. A litter carrier was installed which passes over the centre of each row of pens. At the northwest end a feed room 15 feet 10 inches by 28 feet is partitioned off from the main part. In this room a cooker will be built and a pair of platform scales erected, which will facilitate the carrying on of experiments in feeding pigs. The building is well lighted and ventilated, and when completed will make an up-to-date model piggery, as well as a great addition to the buildings at Nappan.

The rough shed erected for steers last year was enlarged and is now just twice the size, making a shed 20 feet by 80 feet with 7-foot posts in front and 5-foot posts at the back. It is single boarded, battened, and covered with paroid roofing, having four pens 20 feet by 20 feet divided by plank partitions. A long trough goes the full length of the north side of the building, and the steers are fed through a shutter opening on the north side. Doors 4 feet by 6 feet 6 inches open to the south into small yards into which the steers may run. This will house thirty-two steers comfortably, though thirty-four were wintered there last season.

SESSIONAL PAPER No. 16

All buildings were gone over and doors and windows repaired where necessary and roof patched where leaks were noted. This is necessary for the proper maintenance of any building. Moreover, it is more economical to keep the buildings in good repair all the time than to let them get so bad that a general overhauling is necessary.

Fencing.—A new pole fence was erected all around the 50-acre wood lot at the east end of the Farm. In all there were some 8,000 poles laid. All line fences were repaired where it was found necessary.

Clearing new land.—The clearing of new land by prisoners of war was continued. They were worked right from the first of April through the season as the weather permitted up to December 1, 1917. The remainder of the brush was burned off the 25 acres that was chopped out of forest during April, 1917, and north of the main driveway through the Farm. Then this land was stumped, piled and the piles burned early in the fall, so that all this land will require is one more going over with picks and shovels, the small roots taken out and the high hills levelled off, and it will be ready for ploughing. The 41 acres on the south side were also cleared of small roots and burned and prepared for the growing of stecklings.

Drainage.—A large open ditch 5 feet at top and 2 feet wide at the bottom was cut from the north side of the Farm to the south side between the new fields that have been cleared in order to drain the low, boggy swamp. The length of the ditch was about 2,100 feet. Before the season was over the effect of the drainage was most noticeable, and will be very useful in keeping these fields dry. Another small surface ditch was cut south of the 26 acres of new land cleared in 1916 and next to the Roach property south of the Farm, which is now in woods. The size of this ditch was 1,500 feet long, 2½ feet wide on top and 8 inches at the bottom. It has helped very materially to drain this new land and to keep it dry.

Four acres of rotation field B3 were underdrained during the early fall, and two acres of B4. This was laid with 3-inch tile drain 30 feet apart. The remainder of B3 will be completed in the spring, as the ground got too soft to finish it in the fall. The 6-inch main into which these tiles empty, and which runs from the southwest to the northeast through the low gully in B4, was completed, namely about 600 feet. A large 6-inch tile main was laid through the swamp of the new 41-acre field that was cleared during 1916-17. This runs from about the centre of the field at the north side to the southeast corner, a distance of about 1,600 feet. This drain is proving very effective in draining the swamp.

Barnyard.—The major portion of the barnyard was stoned during the season to a depth of 8 to 12 inches, with large stone for a foundation and smaller stone on the surface. The latter was well broken up, making the surface fairly smooth. On this will be spread a light coat of gravel during days that the teams are not busy on other farm work. Some 600 tons of stone were hauled into the yard. This will make a permanent job, and certainly is much better for the dairy stock.

Roadmaking.—As in previous years a certain amount of time was spent in encouraging the improvement of roads and helping to keep them in a better condition for traffic, not only on the main driveways of the Farm, but also on the public highway, from the Farm to the stations, that is to Nappan Station, and Maccan Station. Two bridges that were in bad shape were repaired, and the split-log drag was put over the road several times during the season, especially after heavy rains. This aided much in keeping the roads in shape. The main driveway of the Farm was extended to the back of the lot through the newly cleared fields east of the Farm.

EXCURSIONS AND VISITORS.

Six excursions were held at the Farm during the season. The largest one was that held by the Cumberland County Farmers' Association, the attendance of which was approximately 3,000 people. Many small parties visited the Farm at various times during the season, and the approximate number of visitors would be 4,500 people.

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

THE SEASON.

The winter of 1916-17 began on the 14th November with a snowfall of 7 inches, followed by a drop in temperature on the 15th to four degrees below zero. Most of the snow disappeared later, and though there was a fall of 18 inches through December, it was blown about, and heavy rains left the fields practically bare, and though January was exceptionally severe there was no blanket of snow for the fields until the 21st of that month. February brought a good snowfall and steady cold weather. This snow blanket continued into early April, which month was cloudy, and there was practically no spring-killing of grasses and clovers. May was frosty and cloudy, the soil remaining wet and cold, and there was no growth whatever during the month. June was wet and cold, resulting in thousands of acres throughout the province remaining uncropped. Some sowing and planting was done in July, a month which gave fairly good conditions for crop growth. Rain, mist and fogs were prevalent through August, spoiling, more or less, late hay and greatly damaging grain and potato crops. September was bright and dry, but crops did not recover. They were, however, harvested in good order.

There was frost on September 8 which did much damage in low-lying sections, but little effect of frost at the Station was seen till October 15. October was continuously wet, and potato and root harvesting was much delayed. November brought cold weather on the 7th, and the ground never again thawed; consequently, considerable areas of roots were frozen in. December followed with the record for the coldest ever experienced in New Brunswick. The ground was well covered with snow. Unusually severe cold and rough weather has continued until March 31.

METEOROLOGICAL RECORDS.

Month.	Temperature F.			Precipitation.			Total Sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	
1917.	°	°	°	Inches.	Inches.	Inches.	Hours.
April.....	37.9	64.0	16.0	2.46	16.0	4.06	136.90
May.....	44.1	64.0	25.0	3.07	0.0	3.07	115.95
June.....	58.9	79.5	36.0	5.10	0.0	5.10	153.85
July.....	70.2	90.0	45.0	2.31	0.0	2.31	180.20
August.....	63.7	90.5	39.0	6.00	0.0	6.00	195.65
September.....	53.2	80.0	29.0	1.05	0.0	1.05	201.75
October.....	44.1	65.0	28.0	4.06	0.0	4.60	125.25
November.....	28.4	49.0	- 1.0	1.54	0.2	1.56	101.00
December.....	9.8	37.0	-27.5	0.00	12.0	1.20	83.15
1918.							
January.....	8.0	35.5	-27.5	0.00	32.0	3.2	98.80
February.....	10.27	48.0	-25.5	1.1	23.0	3.4	89.95
March.....	20.5	53.0	-26.0	0.00	36.0	3.6	155.35
Total annual.....				27.23	119.2	39.15	1,637.80

LIVE STOCK.

Horses.—Two pure-bred Clyde mares, five grade Clyde mares, three Percheron grade mares, three grade draught geldings, and two general-purpose mares were worked on the Station during the year. Twelve colts, from weanlings to two-year-

SESSIONAL PAPER No. 16

olds, were reared. A cheap winter ration was fed to two idle horses, costing, from January 1 to April 1, \$8.33 each. Each horse weighed exactly the same at the end of the period as at the beginning. The food cost of rearing draught colts from birth to three years old has been found to range between \$90 and \$100.

Dairy cattle.—Pure-bred herds of Dairy Shorthorns, Holsteins, and Ayrshires are kept, the bull calves being sold for stock improvement and the heifers added to the herd. In the grading-up experiment, seven half-bred Holstein heifers calved during the year, and thirteen half-bred Dairy Shorthorn heifers were reared to breeding age. Half-bred Ayrshire heifers are coming on one year younger. Most of the foundation cows of mixed breeding that were bought in 1914 have yearly improved in their production. One small cow of unknown breeding closed a milking season of 500 days with a food cost of \$107.25 and total value of products of \$276.82.

Beef cattle.—The work with beef cattle was confined to the feeding of three lots of very common steers from 1st November to 1st March, to ascertain the relative profit of grain feeding, liberally and lightly, and feeding hay and roots only. The pen on liberal grain feeding sold at \$9.64 per 100 pounds, gave a profit per head, above cost of feed, of \$5.08; that on light grain sold at \$9.30 per 100 pounds, and gave a profit per head of \$2.47; and that on hay and roots only sold at \$9.22 per 100 pounds, and gave a profit per head of \$2.65. The purchase price of the different pens was identical.

A small bunch of five steers was raised on the Station and up to two years old cost \$80 each for food consumed. They average 914 pounds in weight, worth approximately 10 cents per pound.

Sheep.—The small flock of Shropshire has done well. Eleven lambs were raised, the rams sold and the ewes retained. Fifteen grade Cheviot and Leicester ewe lambs were purchased for crossing with the Shropshire ram.

Angora Goats.—A flock of eleven Angora goats was added to the Station stock in December, with a view of demonstrating their efficiency in brushing new land. With one exception, they have wintered well, though they seemed to suffer somewhat during very severe cold.

Swine.—Five pure-bred Yorkshire sows and a boar were received from the Central Farm. The sows were bred, and were wintered in cabins in the barnyard, fed principally on raw mangels, with some boiled potatoes, middlings, and oats. They have done well. Three young grade sows were also bred and wintered.

POULTRY.

The average number of birds in the flock was 180, comprising 26 Barred Plymouth Rocks, 89 Rhode Island Reds, 43 White Leghorns, and 22 White Wyandottes. The health of the birds was good throughout the year.

The number of eggs laid during the twelve months was 17,670, or an average of 97.6 per bird, selling for \$3.23. The cost of feed per bird for the year was \$2.68, showing a profit of 55 cents per bird per year, disregarding labour and interest on capital.

Incubation results for the season were fair, in spite of the adverse spring.

BEES.

Three colonies were put in an outside wintering case, and two colonies in individual cases in the bee house in the fall of 1916. Two colonies were taken from the outside case and one from the bee house in good condition in the spring. Two swarms were taken and two new colonies formed by division. The season was very poor for honey gathering. The largest amount of honey taken from a single colony was 65½

9 GEORGE V, A. 1919

pounds. The total taken was $212\frac{1}{4}$ pounds. The average weight per colony, spring count, was 64.08 pounds, with an average value of \$11.85 per colony. Two colonies were afterwards united, and all colonies were fed syrup for winter stores, and again packed in winter cases in the same way as the preceding winter.

FIELD HUSBANDRY.

No rotation experiments have yet been started at this Station. Seeding and all field work were delayed by wet weather till the third week in May. The acreage sown to grain was as follows: wheat, 3 acres; oats, 24; buckwheat, $3\frac{1}{2}$; winter rye, $1\frac{1}{4}$; peas, 1; beans, three-quarters; and barley, one-third of an acre. The wheat crop, in common with most wheat in the district, was ruined by a bacterial affection of the glumes and stalks, known as "Glume Spot," and the yield was $9\frac{1}{2}$ bushels of shrunken grain per acre.

Oats were poor, yielding only 24 bushels per acre.

Buckwheat blighted badly, and barley was a failure.

Winter rye gave an excellent sample, and yielded 35 bushels per acre; while Yellow Eye and Small White beans yielded 20 bushels per acre.

With the exception of 2 acres, only land, which had not been underdrained was available for field roots, and it was impossible to get it ready for seeding before July. This land was afterwards flooded and some of the crop entirely destroyed. The acreage worth harvesting averaged in one field $470\frac{1}{2}$ bushels, and in another 413 bushels, per acre; while one acre of Invicta swede on underdrained land, gave 1,260 bushels. Mangels, on similar land, fertilized in the same way, gave 537 bushels per acre. Seeding for both crops was on June 2.

Like the root crop, the potato crop was much injured by wet, as only a small portion was on underdrained land. The average yield was only 170 bushels per acre. The crop was, however, sound, and kept exceedingly well in the cellar.

The acreage for silage corn was reduced on account of the wet season; seeding was late in June and growth was slow. The varieties were Wisconsin No. 7 and White Cap Yellow Dent. Ears were only just formed when the crop was cut. The area was $7\frac{1}{4}$ acres and the yield 87 tons (12 tons per acre). The silage kept well, however, and fed satisfactorily. Seven acres of peas, oats, and vetches were grown, and also put in the silo. The yield was 4 tons per acre, and made good silage. Thirty-two acres in hay gave a yield of 78 tons 878 pounds.

FERTILIZER EXPERIMENTS.

The second year of the experiment on seaweed fertilizer with ten plots of one-twentieth acre each was conducted with wheat seeded with clover, but as the wheat was practically ruined by Glume Spot, the record of yields was very low and inconclusive.

Experiments "A" and "B," occupying seventy-six plots of one-twentieth acre each, to ascertain the minimum quantities of each fertilizing element that can most profitably be used, were on the third year of their rotation, and the experiments are, therefore, complete. The analyses and results of these experiments are reported upon by the Supervisor of Investigational Work with Fertilizers.

To ascertain the fertilizing value of a substance known and sold as "Rito," and to check some of the results from experiments "A" and "B," twenty additional plots of one-twentieth of an acre each were planted to potatoes.

In vegetable growing the comparative yields from heavy manuring versus light manuring combined with chemical fertilizers corroborated the work of previous years in showing that larger yields and earlier maturity can be obtained at much less cost, by a combination of chemical fertilizer with manure, than by the application of manure only.

SESSIONAL PAPER No. 16

CEREALS.

The usual variety tests with wheat, oats, barley, and peas were continued with five varieties of each on quadruplicate plots of one-sixtieth of an acre each. The yields were very low, due to seasonal conditions, including late seeding and the prevalence of bacterial diseases. In wheat, Huron gave the best yield, with 14 bushels and 52 pounds per acre; in oats, Victory, with 28 bushels per acre; in barley, O. A. C. No. 21, with 17 bushels per acre. The peas did not ripen sufficiently to get an intelligent estimate, let alone an accurate statement, of their comparative yields.

FORAGE CROPS.

Twelve varieties of Flint corn and thirteen varieties of Dent corn were tested on plots. The Flint variety giving the largest yield of stalks and ears for silage was a strain of Quebec Yellow with 15 tons 1,000 pounds per acre, and the Dent variety giving the largest yield was Golden Glow with 19 tons per acre. The only varieties to ripen grain were, Native New Brunswick Yellow, Free Press, and Quebec Yellow. The most mature Dent variety was North-west Dent on which the kernels were quite firm with a yield of 16 tons 1,750 pounds per acre. Fourteen varieties of mangels were tested, Tankard Cream giving the best yield with 20 tons 440 pounds per acre. Of four varieties of sugar beets, Royal Giant gave the best crop with 16 tons 1,120 pounds per acre. Of eleven varieties of carrots, Mammoth White Intermediate gave the best yield with 21 tons 240 pounds per acre. Forty varieties of turnips were tested. Among the swedes the largest-yielding variety was Ditmar's Bronze Top, with 25 tons 880 pounds per acre, and the smallest was Canadian Gem, with 13 tons 1,720 pounds. Of the white turnips, Cowhorn was best with 27 tons 900 pounds per acre. A plot of Thousand Headed kale gave a yield of 19 tons 1,600 pounds. Broad Leaf Essex rape yielded 16 tons 1,000 pounds, and Dwarf Essex rape 15 tons 600 pounds per acre at one cutting. With the exception of a four-year-old plot of the Ontario Variegated strain, all the alfalfa seedings were rendered practically valueless from winter-killing.

Growing Turnip Seed.—When information was received that the Experimental Farms system was expected to co-operate in meeting the shortage in root seeds for 1919, 46 acres of sod land were prepared as rapidly as possible for the growing of turnip stecklings. This acreage was seeded from the 25th July to 6th August, and 500 pounds per acre of 3:10 fertilizer was applied in the drill. Growth was disappointingly slow and, in an effort to give these little turnips all possible time for growth, unusually cold weather at the end of October froze them in and, with the exception of one day later, it was impossible to pull them. Experiments in covering with straw before the snow came and at different times during the winter and spring have been tried to see how they can best be brought through the winter. At this date it is certain that those under straw, put on before snow came, have wintered well. As large an acreage as possible will be devoted to seed raising in 1918.

FIBRE PLANTS.

An acre of flax was grown for fibre, and gave a yield of 3,560 pounds of long staple straw, pronounced excellent for fibre purposes. A plot of hemp gave a yield at the rate of 24,000 pounds per acre.

HORTICULTURE.

Fruits.—All tree fruits and small fruits have done well during the year. There has been no loss observable on the 31st March from winter-killing, and wood growth was vigorous in 1917. Most of the vacancies were filled among the apple trees, and two each of fifteen new varieties were planted for test in the variety orchard. The apple crop was very light but all small fruits, with the exception of strawberries, gave large yields.

9 GEORGE V, A. 1919

Vegetables.—Variety tests were continued with vegetables, and good yields obtained except with beans and squash. Potatoes were grown on between thirteen and fourteen acres. Two acres were devoted to testing strains of Green Mountain and Irish Cobbler received from 300 different farmers, an acre and a half to planting for disease investigation, five acres for the growing of seed of pure varieties, one acre to secure cost of production data, one for spraying experiments, one under fertilizer tests, an acre and a half for variety and cultural tests, and some early potatoes for the Bermuda seed trade and table purposes. The yields were low in all cases, and the cost of production high. The cost of production acre in 1917 gave a yield of only 173 bushels at a cost of \$141.88, while, in 1916, a yield of 330 bushels was obtained at a cost of \$89.02.

Ornamental Gardening.—Roadside trees, clumps of shrubbery, specimen trees, windbreaks, and hedges were planted quite extensively and successfully. The season, while unfavourable for most crops, was favourable to tree growth. A large number of trees and shrubs were distributed for the school grounds in various parts of the province. What was left of the original nursery was transplanted to new ground.

FARM IMPROVEMENTS.

Buildings.—The potato cellar was enlarged, and a concrete top to replace the pole and earth covering put on. Upon this was moved a barn 30 by 40 feet in size, and a room fitted up in this to permit the carrying on of investigational work with potatoes during the winter.

A three-room dwelling was fitted up, and the buildings kept in order by general repairs.

Fencing and Draining.—Temporary fencing was erected with woven wire to take the place of barbed wire, on account of the addition of sheep to the live stock of the Farm, but no permanent fencing was done.

Slightly over 2,000 feet of heavy open ditching was done, to make it possible to proceed with the clearing of land and to reclaim pasturage. Five thousand feet of clay and cement tile were laid to enable the cropping of additional wet land. The method of ploughing in narrow ridges and clearing out the dead furrows with a horse-drawn ditcher was followed, where necessary, in the absence of underdrainage.

Clearing Land.—A large amount of stone was removed from land newly broken and cropped last year and two acres additional were brought into crop. No expenditure was made on stumping, but thirty acres were brushed and burned and made ready for pasture.

Roadmaking and Grading.—Only at such times as the weather prevented work on the land, was any labour put on the roads. Some excavating was done for the laying of driveways, and stone was hauled to be broken and distributed. Gravel was obtained and distributed on the Farm roads where most needed, and some concrete culvert work accomplished.

EXHIBITIONS.

No large shows were held in New Brunswick during the year, but a portion of the Station exhibit was sent to the local fall fair at Centreville in September, to the annual potato show at Woodstock in January and to the provincial seed fair at Fredericton in March. Literature was distributed in considerable quantities at each show mentioned, and the attendants kept busy in discussing questions and giving information.

EXCURSIONS.

On Labour Day the Farmers' and Dairymen's Association arranged, in conjunction with the Station, to hold a conference, and about 1,600 visitors attended; of these 1,200 partook of a lunch provided by the Station and prepared and served by the Fred-

SESSIONAL PAPER No. 16

erickton Women's Institute. Mr. Thos. Hetherington, Provincial Live Stock Superintendent, demonstrated on dairy cattle and sheep and addresses were given by Hon. J. F. Tweeddale, Prof. W. S. Blair and the Superintendent.

The field crop judges for the province met at the Station to practise their work and early in October the Provincial Normal School students visited the Station in a body.

In March, the members of the Farmers' and Dairymen's Association of New Brunswick spent an afternoon at the Station when addresses were given by Prof. J. W. Mitchell, Assistant Commissioner of Agriculture for Canada, upon dairy cows; by G. C. Cunningham, plant pathologist, and by the Superintendent.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIERE, QUE.**REPORT OF THE SUPERINTENDENT, JOS. BEGIN.**

CHARACTER OF SEASON.

The winter of 1916-17 was dry and very cold until the end of March. The snowfall was the heaviest recorded for a number of years, and was late in disappearing in the spring. The first work on the land at the Station was done on April 26, and by the last of the month about ten acres of wheat and other grains had been sown on well-drained land. May was rainy and cold until the 26th, and it was only after that date that spring work on the land was general in the district. Some fine weather early in June permitted of a certain amount of seeding being done, but this was followed by three rainy weeks so that seeding operations were kept back until the last of the month. The rainfall for the months of May and June was 10.3 inches, falling on twenty-eight different days, and the hours of sunshine for these two months gave an average of only 5.4 hours per day. In short, the spring of 1917 was extremely unfavourable for seeding, and had a marked effect upon the area sown that year. July was a fairly favourable month, but growth would have been more rapid had the temperature been higher. August was very rainy and unfavourable to haying operations, which were performed with great difficulty. September was the best month of the season in spite of nine days of rain. Part of the grain harvesting was done during this month. On September 10 and 11 a frost damaged some of the unripened grain in many places. It is seldom that a frost occurs so early in this district. October was very rainy and unfavourable to saving the remainder of the grain crops, the getting-in of the potatoes, and the harvesting of the roots. The winter months of 1917-18 have established a record for a heavy snowfall and steady cold up to March 31.

METEOROLOGICAL RECORDS.

	Date.	Temperature.				Precipitation.				Hours of Sunshine.	
		Maxi- mum.	Date.	Mini- mum.	Mean	Rainfall Inches.	Snow Inches.	Total Inches.	Number of days.		
									Rain.		Snow.
April.....	23	53.7	11	12.6	34.1	1.61	7	2.31	7	5	138.05
May.....	31	71.1	5	29.8	42.0	3.64	.....	3.64	15	.....	159.12
June.....	14	81.2	9	55.0	54.6	7.68	.....	7.68	13	.....	168.44
July.....	31	89.2	2	40.2	61.6	2.29	.....	2.29	8	.....	241.53
August.....	1	90.7	30	36.6	59.7	3.63	.....	3.63	15	.....	218.27
September.	19	77.7	30	32.4	50.6	1.18	.....	1.18	9	.....	209.08
October....	19	70.4	25	31.0	41.3	5.56	.....	5.56	12	.....	84.37
November.	1	43.0	29	1.2	27.0	0.08	13	1.38	2	6	109.32
December .	21	39.4	29	26.8	14.2	0.04	13	1.34	2	6	91.46
1918.											
January....	7	34.6	27	27.0	8.6	.....	28	2.80	.....	10	87.10
February...	20	45.8	6	28.0	7.4	1.50	19	3.40	2	13	90.41
March.....	31	45.8	4	6.6	19.1	0.22	6	0.82	2	5	213.22
Totals.....	.....	.....	.....	.....	.....	27.43	86	36.03	87	45	1,810.37

LIVE STOCK.

Horses.—There are at present on the Station sixteen heavy draught horses made up of four good Percheron mares and twelve heavy grade horses; also one French-Canadian mare, and two Percheron colts one year old. The Percheron mares were bought with the double purpose of helping in the work on the Station and of carrying on experiments in the breeding of pure-bred Percherons. This breed seems to have a promising future in this district where there are already several fine specimens. Two Percheron colts were brought up during the year, one having been bought with its mother at the age of forty-five days. Circumstances permitting, the colts were not weaned until seven months of age. The cost of raising the colts necessarily includes the cost of keeping the mother during the seven months before the colt was weaned.

For the information of the reader, the prices of feeds upon which the cost is based are given. The price is an arbitrary one and serves as a basis for establishing the cost of raising and keeping the different classes of live stock. The average price really paid for feed during the year is also given. These prices are: grain, bran, and chop, 1½ cents; hay, \$7 per ton; roots and ensilage, \$2 per ton; whole milk, \$1.60 per hundredweight; skim-milk, 20 cents per hundredweight. The average price of feeds for the year are: grain, bran, and chop, 2½ cents per pound; hay, \$12 per ton; pasture for cattle was charged at the rate of \$1 per month, and for horses, \$2 per month.

Cost of maintenance of a Colt bought when forty-five days old: Feed consumed by the mother during five months of nursing, 1,888 pounds of grain and chop; 1,975 pounds of hay; 2½ months' pasturage. Feed consumed by the colt from the date of weaning to 31st of March, that is, seven months: oats, 579 pounds; bran, 624 pounds; chop, 309 pounds; hay, 2,234 pounds; whole milk, 75 pounds; roots, 676 pounds. From this it would appear that the cost of raising the colt up to the time of weaning was \$35.51, and from the date of weaning until March 31, \$28.60, or \$63.11 in all; the prices of feeds being those arbitrarily fixed. At the average prices paid for feeds in 1917-18, this colt cost \$101.93 for feed. The weight of its mother was 1,750 pounds. The colt weighed as follows at the ages indicated: at three months, 590 pounds; at six months, 795 pounds; at nine months, 990 pounds; and at twelve months, 7,175 pounds.

The Cost of a Percheron Filly born April 11, 1917, up to the 31st of October.—For the upkeep of the mother during the nursing period; oats, 901 pounds; bran, 683

SESSIONAL PAPER No. 16

pounds; chop, 100 pounds; hay, 2,384 pounds; pasturage, 4½ months. Feed for the colt from November 1, that is the date of weaning, up to March 31: oats, 478 pounds; bran, 448 pounds; chop, 152 pounds; whole milk, 71 pounds; roots, 497 pounds. From this it would appear that, based on the arbitrary cost of feed as given above, the total cost for raising this colt for the year was \$58.33, and at the actual prices paid for feed during the year the total cost was \$94.58. The weight of the mother was 1,775 pounds. The colt weighed, at six weeks, 350 pounds; at three months, 540 pounds; at six months, 785 pounds; at nine months, 960 pounds; and at the end of the year, 1,125 pounds.

It will be noted that in the above cases the total cost of keeping the mare during the nursing period is charged against the colt, as this was the sole duty performed by the mother during the above period. It was believed that this extra charge would be more than compensated by the strong growth of the colt so necessary for its perfect development.

The cost of maintenance of twelve heavy horses employed in heavy work at the Station was carefully kept. The total cost of feed amounted to \$915.76 for the twelve, or \$76.31 per head per year, or 20.9 cents per head per day. The total number of hours of work for the twelve horses was 32,892, and the average 1,991 hours per horse for the year, and a daily average of 6.5 hours per horse. Each hour's work, therefore, cost 3.8 cents for feed. The above figures are based on arbitrary cost values of feeds. At the average prices actually paid last year, the total cost would be \$1,595.32 for the year for twelve horses; \$132.94 per horse; 36.4 cents per head per day. At this price an hour's work would cost 6.67 cents.

Two light horses, employed in garden and express work, cost 31.6 cents per horse per day for the seven months, April to October, and 15.9 cents per day for the five winter months; the reduction in cost during the winter being due to reduced rations of grain and hay, compensated for by feeding straw and roots. As showing that the horses thrived well during the winter on these reduced rations, it may be said that on November 1, the total weight of the horses was 2,380 pounds, and on March 31, 3,475 pounds. For roots, turnips, beets, and carrots, were fed, the last named being apparently preferred by the animals, although the beets were well enough liked.

Dairy Cattle.—These comprise fifteen pure-bred Ayrshires, ten cross-bred cows, and three grades with Ayrshire blood. The young stock comprise eight Ayrshire heifers from six to thirty months of age, and four Ayrshire grades of similar age, nine calves less than six months, and two mature Ayrshire bulls. Two Ayrshire cows and four young bulls of the same breed were sold during the year.

Milk Production.—Twenty-four cows completed their lactation period during the year, with a total production of 145,621 pounds of milk, or an average of 6,068 pounds per cow. This return is fairly satisfactory when it is remembered that four young heifers completed their first lactation period and four others their second. The average yield of butter-fat for the herd was 4.1 per cent; the total production of butter-fat being 5,970.46 pounds for the herd, or a total butter production of 7,024 pounds; an average yield of 292.7 pounds of butter per cow.

Cost of raising a Heifer.—In order to ascertain the cost of raising a heifer up to the time of the birth of her first calf, details have been kept with care for each calf raised. At the arbitrary prices used for feeds, the average cost of raising each heifer works out at \$65.78 per head. Last year, however, at the average actual prices paid for feed, the cost of raising amounted to \$97.17. The average weight of the heifers at two years old was 884 pounds.

Beef Cattle.—Three steers, with some Ayrshire blood, were kept in order to establish whether there was any profit in raising these animals and marketing them at about one year old. The main experiment in view was to use as little milk as possible

9 GEORGE V., A. 1919

in order to see whether the common calves generally sold in the district for veal might be more profitably kept and sold later as beef. The total cost of feed for these steers amounted to \$82.23. Each pound of gain in weight cost 5.264 cents. The steers were sold at 8.567 cents per pound, and the net profit per pound of gain was 3.203 cents; the prices of feeds being the arbitrary ones referred to above. On account of the prices paid last year, however, each pound of gain cost 8.075 cents, so that there was barely $\frac{1}{2}$ cent per pound of grain profit. It would seem from this experiment that only a very small profit can be expected from the sale of young beef animals of light weight and of the dairy breeds. Doubtless, with the beef breeds the result would be different.

Swine.—A good boar and six good sows of the Yorkshire breed were wintered out-of-doors in simple cabins, and in spite of the exceptionally low temperatures, they always seemed to be comfortable. No experimental feeding work was done owing to the difficulty of procuring suitable feeds.

Sheep.—One ram, seven ewes, and six lambs of the Shropshire breed form the present pure-bred stock, and seven cross-bred lambs will be used as the basis of a flock of cross-bred Shropshires. Sixteen lambs were sold at an average price of \$11.95 each, the average weight of fleeces was 6.7 pounds and wool sold at 55 cents per pound.

Poultry.—White Wyandottes and Barred Plymouth Rocks were kept. Three hundred layers were divided into six lots, and experiments were carried on to determine the values of different grains in feeding laying breeds. Two hundred and eighty pullets were raised during the year, and one hundred and twenty of these were selected to form a flock for winter laying; the remainder were sold at the average price of 27 cents per pound.

Bees.—Twenty-seven colonies were placed in the bee cellar in the winter of 1916, and all wintered well except one. Eight colonies wintered in the open in wintering cases came out stronger in the spring than those wintered in the cellar. Those outside consumed an average of 12.4 pounds of feed during the winter, while those in the cellar consumed an average of 13.8 pounds. Different experiments were carried on with the bees, such as determining the best feed to give them during winter, the prevention of swarming, and the increasing of the workers in each colony. The average honey yield of each colony was the lowest record yet, on account of the extremely unfavourable weather at the time of the honey flow, although the daily production was the highest ever noted. The reason for the above is that in this section the period of honey flow is so short that each day of unfavourable weather lessens by a considerable amount the total production.

FIELD HUSBANDRY.

Rotations.—Four regular rotations were carried on, including the cultivation of forage plants, the growing of grains for seed, and the production of hay from leguminous and grain-bearing plants.

Roots and Ensilage Corn.—In all the rotations provision is made for the production of roots and ensilage corn. The average yield of the latter for the last four years has shown that the climate in this district does not allow a heavy yield, but its cultivation is less expensive than that of roots and permits of an indirect preparation of the soil for the following crop, while at the same time giving a fair yield as a rule.

Compared with roots, the results of the past four years have shown that in this district one may expect a heavier yield of nutrients than is the case with ensilage corn. The cost of growing the roots, however, is considerably higher. The average yield for ensilage corn for the year was 12 tons 850 pounds per acre and 22 tons 400 pounds per acre for the roots.

SESSIONAL PAPER No. 16

Grain Crops.—On the regular rotations the average yields were as follow:—

	Bush.	Lb.
Marquis Wheat..	41	45
Huron Wheat..	43	20
Banner Oats..	66	8
Daubeney Oats..	63	12
Success Barley..	31	15
Manchurian Barley..	38	6

Clover hay yielded a little better than the average, and hay on two-year-old meadows gave about an average yield.

HORTICULTURE.

Orchards.—Some twenty-eight varieties of fruit trees were planted in the experimental orchard. In general the trees made an excellent growth of new wood which ripened well. The fruit crop was below the average. Owing to the difficulty in getting the necessary amount of skilled labour, the experiments with vegetables were suspended during the year, the only ones carried on being those dealing with varieties of potatoes and the different cultural methods to be pursued in growing these along with certain spraying experiments.

SPECIAL CROPS.

Twenty-five acres of roots were sown in July for the production of stecklings. The growth of these was slow at first, but was very good in August and September. The total crop of stecklings was estimated as sufficient to plant from forty to fifty acres for seed production next year. The stecklings were pitted from the 8th to the 15th of November during very unfavourable weather.

An acre of flax for fibre was grown, and one-tenth of an acre of hemp. The yield was excellent, and was shipped to Ottawa for treatment.

GENERAL NOTES.

Tile-drainage work was not carried on during the year with the exception of the laying of 2,500 feet of collecting tile. The surface drainage was improved over a large area of low land.

Twelve acres of new land were stoned and placed under cultivation, the stones being used for making approaches to the Farm buildings.

Farm exhibits were shown at St. Damien, Montmagny, St. Pascal, Rivière-du-Loup, Sandy Bay, and Murray Bay. Material was also furnished the representative of the Canadian Government for certain expositions in the New England States.

Three farmers' excursions from different sections of the district, totalling some 3,800 visitors in all, visited the Station. Those taking part in short courses, and members of the Council of Agriculture, as well as numbers of other groups, from time to time also visited the Station.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, G. A. LANGELIER.

CHARACTER OF SEASON.

The six months during which plants make their growth in central Quebec, May to October, inclusive, were colder, wetter and duller than the average for the last six years, the mean temperature being, respectively, 55.68° and 56.60° F., the precipitation 30.34 and 24.59 inches, the number of hours of sunshine 902.8 and 1,075.3. The season without frost was shorter than usual, the last one occurring on May 16 and the first one on September 23, which left only 130 free days. Of the different crops

grown in the district, hay, plums, currants, gooseberries, lettuce, celery, ornamental plants and perennials were very good; corn for silage, wheat, strawberries, cabbage, were a little above the average; oats, barley, apples, cauliflower, cucumbers, squash, melons, onions, garden peas, garden beans, annual flowering plants, somewhat below the average; swedes, tobacco, raspberries, sweet corn, potatoes, tomatoes, peppers, egg plants, Brussels sprouts, poor. The main characteristic of the season was the unusually long wet and dull spells.

METEOROLOGICAL RECORDS.

—	Temperature F.			Precipitation.				Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hours.	Total.
1917.	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
April.....	56.0	10.0	35.25	1.19	1.00	1.29	0.22	114.3
May.....	77.0	28.2	46.2	2.55	1.00	2.65	0.95	153.6
June.....	80.0	42.2	59.5	8.56	.....	8.56	0.90	136.4
July.....	89.0	51.2	67.3	3.19	.....	3.19	0.74	212.4
August.....	92.0	44.2	65.92	6.69	.....	6.69	0.76	192.2
September.....	77.0	29.2	53.4	2.47	.....	2.47	0.73	162.3
October.....	70.0	30.2	50.1	6.78	.....	6.78	1.56	45.9
November.....	42.0	— 3.0	25.78	0.34	9.40	1.28	0.30	83.8
December.....	38.0	—34.7	8.36	0.12	31.00	3.22	0.60	54.9
1918.								
January.....	32.0	—31.7	5.12	.....	34.00	3.40	1.00	38.1
February.....	44.0	—34.7	6.08	1.10	24.50	3.55	0.85	64.3
March.....	44.0	—10.0	19.88	0.25	25.00	2.75	0.65	143.6
Total.....	.....	.....	.....	33.24	125.90	45.83	.....	1.401.8

LIVE STOCK.

The live stock kept in very good condition throughout the year.

DAIRY CATTLE.—The herd is composed of 48 head, forty-two of which are pure-bred, and six grade, French Canadians. They are kept for five purposes: Supplying milk to the dairy, experimental breeding, experimental feeding, experimental housing, and to distribute high-class breeders at reasonable prices.

Milk production.—Eleven heifers and cows, ranging in age between 3 and 12 years, finished a lactation period during the fiscal year. Their total production was 65998.5 pounds of milk, testing 4.35 per cent butter-fat, which is equivalent to something like 305 pounds of butter per animal. This is an average of about 700 pounds of milk or 50 pounds of butter more than the previous year.

Experimental Breeding.—Out of nine grade cows bought for this purpose only two proved profitable producers and not one of their heifers, by a scrub bull or by a pure-bred bull of unknown ancestry, was a very good milker. This shows that both the sire's dam and the dam must be good producers to give profitable offspring.

Experimental Feeding.—There are four projects: whole milk versus skim-milk and supplements for calves, feed requirements of heifers until calving time, extra good versus average rearing of heifers as influencing size, type and also production of the mature cow, and unlimited versus limited meal for dairy cattle.

Whole Milk versus Skim-Milk and Supplement for Calves: All the feed given to nine calves was weighed until they were twenty-four weeks of age. Calculating hay at \$7 and silage or roots at \$2 per ton, whole milk at \$2, skim-milk at 25 cents, commercial calf meal at \$4, home-made calf meal at \$3.65, and ordinary concentrates at

SESSIONAL PAPER No. 16

\$2.50 per hundred pounds, the results of one year show that the average cost of feed was \$52.80 for each of the "whole milk" calves, \$17.86 for each of the "skim-milk and commercial calf meal" calves, and \$16.81 for each of the "skim-milk and home-made calf meal" calves. Each of the three latter received, on an average, the following quantities of feed during the twenty-four weeks: 89.5 pounds of whole milk, 2,322 pounds of skim-milk, 266 pounds of concentrates, 220 pounds of hay, 103 pounds of roots, 15 pounds of silage. The average weights at birth were, respectively, 67, 70, 66 pounds, and at twenty-four weeks 371, 295, 290 pounds. This experiment will be continued for a few years, but the results of one year show that even if the youngsters are heavier and sleeker, whole milk is too costly to use until calves are twenty-four weeks old; also that there is practically no difference between the commercial and home-made calf meals. The home-made meal consisted of 6 parts corn, 3 parts oats, 1½ part flax seed, by weight, all ground together.

Feed requirements of Heifers until calving time: The following feed valuations are given because they were used from the start to the finish of the first experiment, but they were changed in 1917 for the calves which were born that year: whole milk, \$1.50, and skim-milk, 20 cents per 100 pounds; meal, 1¼ cent per pound; hay, \$7; green feed, roots, silage, \$3 per ton; pasture, \$1 per month. The results show that for each of four heifers it cost, on an average, for feed alone, \$64.60 to bring them until calving time at 27 months and 25 days, when their weight was 798 pounds. During that time each of them had received 892 pounds of whole milk, 7,553 of skim-milk, 764 pounds of meal, 2,910 pounds of hay, 5,590 pounds of roots, 6,074 pounds of silage, 181 pounds of green feed, and had been ninety-four days at pasture. With more pasture available, the cost would have been somewhat decreased.

Extra good versus average Rearing of Heifers as influencing Size, Type, also Production of the mature Cow: Twins were chosen for this experiment so that the results will not be influenced by the breeding of the animals. These heifers were dropped on June 6, 1916 and on April 1, 1918; when they were 21 months and 25 days, the one which had been highly fed weighed 785 pounds and had cost \$54.59 for feed alone, at the valuations given in the preceding paragraph, whilst the one which had been reared about as at the average farmer's place weighed 600 pounds and had cost \$36.05. These heifers will be followed until they are mature cows, and it will be interesting to note the influence of rearing on each of them.

Unlimited versus limited Meal for Dairy Cattle: This experiment has now run five years in succession, during winter, and as the cows used for it were practically all spring calvers, it explains the small profits over feed. Animals were chosen of nearly the same weights and production, and they all received the same quantities of hay, straw, silage, and roots. As records were kept very accurately for twenty-seven cows, it is presumed that the following figures are fairly conclusive. The average for five years shows that each cow of the lot receiving as much meal as would be eaten, which was one pound per 2.18 pounds of milk, gave a profit over feed of \$15.26 in 147 days, each cow of the lot receiving one pound of meal per 4 pounds of milk gave a profit of \$14.22, and each cow of the lot receiving 1 pound of meal per 8 pounds of milk gave a profit of \$14.19. The valuations were as follows: hay, \$7; roots and ensilage, \$2 per ton; meal, 1¼ cent per pound; butter, 28 cents per pound; and skim-milk, 20 cents per hundred pounds. These valuations were used in 1913, when the experiment started, and it was thought best to keep them right through. The results show that it pays to feed well.

Experimental Housing.—Buildings, nowadays, cost so much to erect and keep in good shape that the interest and depreciation eat up a good part of the profits. It is thought that, for cattle, only the cows in milk and calves need to be housed in expensive constructions, whilst bulls, young stock, and dry cows can do very well in cold quarters. Since 1915, the bulls have been kept all the year around in single-boarded sheds, with open fronts to the south; not only did they do well, but one old animal,

9 GEORGE V, A. 1919

especially, who had got very sluggish when inside, proved to be a much surer sire after having been out during a whole winter. In future, all heifers will be raised in these open sheds, from the time they are from four to eight months of age until a couple of weeks before they are due to calve.

Selling breeders at reasonable prices.—The three bulls used, all bred at the Station, are out of dams which have qualified for the Record of Performance, and there are more cows at Cap Rouge which have this distinction than in any other herd in Canada. Young stock from such foundation would be desirable even at high figures, but as only medium prices are charged, it is easy to see that the farmers of the district derive great benefit from this.

HORSES.—There are now 27 horses, including 23 registered French Canadians, three draughters and a driver. They are kept for five purposes: work on the farm, experimental breeding, experimental feeding, experimental housing, and to distribute high-class breeders.

Work on the Farm.—During the year, each horse averaged over 200 full days of ten hours, leaving aside the unbroken colts. As five mares raised foals, this is a very good record. The cost of horse work, per hour, is now extremely high, and it behoves all farmers so to plan their operations that the working stock is advantageously employed during as many days as possible through the year.

Experimental Breeding.—Three projects are under investigation: close breeding, raising fall colts, work versus no work for brood mares.

Close Breeding: A mare has now raised two foals, a filly and a colt, by her son, and in each case the youngsters weighed less at birth, at six months, and at a year than others by the same sire out of unrelated dams of about the same weight. This will be continued with the same mare, also with another one whose son will be old enough for service in 1919.

Raising Fall Colts: If it was practicable to have mares drop their young in the autumn, there is no doubt that the dams could do much more work during the year. However, mares do not always come in heat in the fall and also they are more liable to miss at that time. But there have been colts raised in the autumn, so that it is not an impossibility. Two mares dropped, one a colt and the other a filly, in the fall of 1916; both youngsters have done very well, though at first, possibly on account of the close confinement in the stable during winter, they did not seem to start well. That they have overcome this initial disadvantage is shown by the fact that the colt weighed 1,040 pounds at 18 months, the average weight of his sire and dam being 1,285, whilst the filly weighed 775 at the same age, the average weight of her sire and dam being 1,200.

Work versus no Work for brood Mares: The same mare raised a filly three years in succession and they are all doing very well, though one year the dam was worked carefully until foaling time, the next year she was kept idle in a box stall until about a month before dropping her young, when she was put to medium work, and the last year she was kept outside, with only a single-boarded shed as a shelter, until four or five weeks before foaling, when she was put to medium work. It is probably better to work a mare carefully until she foals, but farmers who cannot do so should not, by this fact alone, be deterred from raising horses.

Experimental Feeding.—There are two experiments in regards to the quantities of feed required to rear a young animal until he is ready to earn his living, and as to the quantities of feed required during a year by a work horse.

Feed required to raise Horses: All feed given to a colt and two fillies was weighed until their average age was 34 months and 7 days, when they were broken and ready to earn their living. The quantities consumed by each were 13,063 pounds hay, 4,278 pounds oats, 4,830 pounds bran, 29 pounds wheat, 5 pounds oil cake meal, 1,036 pounds skim-milk, 29 pounds whole milk, and they had very little pasture. It cost \$161.34 for

SESSIONAL PAPER No. 16

each of them for feed alone. Valuations of feed were decided upon before prices went up, and it is thought better still to use the old figures, though anybody can, with the quantities stated, calculate what it will cost at other valuations; they were as follows: whole milk, oats, oil cake meal, 1.5 cent per pound; wheat, 2 cents per pound; bran, 1 cent per pound; skim-milk, 20 cents per 100 pounds; hay, \$7 per ton. These young horses were very well grown, as their average weight at less than three years was 1,310 pounds, whilst the average weight of their sires and dams is only 1,275 pounds.

Feed required for Work Horses: All feed given to two mares was weighed during one year and the number of hours which they worked was recorded. Their average weight was 1,210 pounds at the beginning of the experiment and 1,220 at the end. Each one of them ate 4,440 pounds of hay, 4,770 pounds of oats, 972 pounds of bran, 132 pounds of common molasses, and worked 1,639 hours, so that every hour of labour cost about 10 cents for feed alone, calculating hay at \$10 per ton, oats at 2½ cents, bran at 1½ cent, and molasses at 3½ cents per pound, which were the average prices during the year. If interest, depreciation, barn room, shoeing, blanketing, harnessing, doctoring, and care are taken into consideration, it is easily seen that horse labour is very costly; but it should not be cut down by giving less feed, as long as none is wasted, but rather by making the labour more effective, and especially by having more of it during the year. It is very likely that if the two above-mentioned mares had worked 50 per cent more hours, which was possible, it would not have taken probably more than 10 per cent extra feed.

Experimental Housing.—All colts are raised in single-boarded sheds at this Station, from the time they are weaned until they are broken. During five years, fifteen different young horses were wintered outside, and though the temperature went down as low as 34° F. below zero, not a single one was ever seen to shiver. The doors of the sheds are kept open day and night, except possibly four or five times a year during heavy storms. These colts generally commence to shed their hair earlier than the horses kept inside, they are always healthy, owing to the pure air, and have strong limbs due to the exercise. These advantages more than counterbalance the little extra feed required to keep the bodies of the animals warm.

Selling breeders at reasonable Prices.—The stud of French Canadian horses at Cap Rouge is, without the least possible doubt, the largest and best in existence to-day. About half a dozen youngsters are raised each year, and some of them have been shipped to Ontario, New Brunswick and Nova Scotia, besides Quebec.

SHEEP.—The flock comprises a three-year-old-ram, six yearling rams, seventeen breeding ewes, nine shearling ewes, and twelve lambs, or a total of forty-five, all pure bred Leicesters. They are kept for experimental feeding, experimental housing, and to sell breeders at reasonable prices.

Experimental Feeding.—The work undertaken is to find out just how much feed it takes to winter a breeding ewe. Leicesters of a little above medium size are kept at Cap Rouge, and the figures are for females, most of which were carrying young. For an average of two years, feed given daily to each animal during the two hundred days between good grass in the autumn and in the spring, was as follows: 3.09 pounds hay, 0.23 pound pea straw, 1.79 pounds swede turnips, 0.87 pound oats, 0.60 pound bran. The total number of ewes thus fed was 28. Calculating hay at \$10 per ton, straw at \$5, swedes at \$4, oats at 3 cents per pound, and bran at 1½ cent, it would cost \$10.95 per head for feed during the winter.

Experimental Housing.—The breeding ewes are wintered in a single-boarded shed with the front, facing south, always open. When lambing very early, they are sometimes brought to the sheep barn, but when the youngsters are from two to six days old, they go back to the shed, with their mother, even if it is in March. And March, in central Quebec, is often as rigorous as January in many parts of Ontario.

9 GEORGE V, A. 1919

Selling breeders at reasonable Prices.—Leicesters are very popular in central Quebec, and a great many orders, especially for rams, have to be refused each year. What is sent out is first-class stock which should, and will, no doubt, improve the flocks of the district.

POULTRY.

About three hundred Barred Rock hens were wintered in 1917-18, but as a great number were sold after the incubation season, the average number kept during all the year was 181. They laid 14,900 eggs, or about 82 per hen. From 4,128 eggs, 537 chicks were raised to marketable age, which means that it took more than seven eggs for a chick. There were 15 per cent of the eggs which were not fertile and 56 per cent of the fertile eggs did not hatch, whilst 65 per cent of the chicks died or were taken away by crows, hawks, foxes, or other rodents. Much better results should, and will, be had at this Station. Poultry is kept for experimental breeding, experimental feeding, experimental housing, and to distribute good stock. Egg preservatives are also compared.

EXPERIMENTAL BREEDING.—This consisted in comparing pullets with hens as breeders, also as producers of winter and of hatchable eggs.

Pullets versus Hens as Breeders.—It is generally thought that the eggs from pullets are not as good for breeding purposes as those from hens. The results of two years at Cap Rouge show that there is practically no difference, even if late birds are included amongst the pullets. The difference, though small, was against the hens. It is, however, wise to wait a few years before forming a decided opinion regarding this.

Layers of different Ages.—Four pens of 25 birds each were used during the months of November, December, January, February, three years in succession, with the result that, on an average, the cost of production of eggs was the lowest for the early pullets, it being 18 per cent larger for the yearling hens, 413 per cent for the old hens, and 928 per cent for the late pullets. This experiment will be continued, but it corroborates the advice generally given not to keep old hens nor hatch chicks too late.

Heavy versus light Layers as Breeders.—Contrary to expectations, the results of two years show that the eggs from the heaviest layers produced the greatest number of living chicks. The pens used produced, respectively, during four months, 348, 143, 90, and 55 eggs, and the percentages of chicks hatched from the fertile eggs were 64.3, 62.7, 60.2, and 59.5.

EXPERIMENTAL FEEDING.—There are four experiments to compare different kinds of feeds and watering: skim-milk versus beef scraps, roots versus clover, commercial grain versus separator screenings, water versus snow.

Skim-milk versus Beef Scraps: All feed was the same for both pens, with the exception that one received skim-milk and the other beef scraps. The average of two years shows that during November, December, January, and February, the twenty-five birds in the "skim-milk" pen produced \$6.72 worth more of eggs and meat (increase in live weight) than the others. This is important, as dairy by-products are available on nearly every farm.

Roots versus Clovers: Everything fed to two pens was the same, excepting that one received sweedes and the other dry clover leaves. The results were practically the same, as the "swedes" pen was only 21 cents ahead of the other at the end of the experiment.

Commercial Grain versus Separator Screenings: Two pens of twenty-five birds each, of about the same ages, were fed alike except that one received commercial grain and the other screenings from the fanning mill, such as any farmer who cleans his

SESSIONAL PAPER No. 16

grain for seed would have on his place. The average of two years shows that, valuing the screenings at two-thirds the price of the commercial grain, the latter were \$5.82 ahead during the four winter months.

Water versus Snow: Both lots of twenty-five birds received the same quantities of feed, whilst one of them had water and the other snow. The pen which had water for the four winter months, during two years, was \$1.72 ahead of the other. This experiment will be continued.

EXPERIMENTAL HOUSING.—The range of temperature, averaging the winters of 1916-17 and of 1917-18, was 38.8° F. outside, 25.4° in a colony house 8 feet wide, 23.9° in a laying house 12 feet wide, and 23.6° in a laying house 16 feet wide. All styles of houses were of the ordinary shed-roof pattern, and had twice the area of cotton as of glass in the front. These records will be gathered for a few years more.

DISTRIBUTING GOOD STOCK.—Eggs, young chicks and breeding stock are sold each year at prices current in the district. It is very easy to start with good stuff in poultry without incurring heavy expense. Gradually farmers are changing their scrub hens for pure-bred ones, and the flocks, besides looking much better, are more uniform and bring higher profits. Nothing but first-class eggs or birds are sold for breeding purposes, the rest being disposed of for consumption.

EGG PRESERVATIVES.—For two years, eggs have been preserved at this Station in different ways: wrapped in paper and left alone, wrapped in paper and turned daily, in oats, in sawdust, in lime-water, in water-glass. Samples of each lot are sent to the Chemistry and to the Poultry Divisions at Ottawa, to be tested, and are also tried at Cap Rouge. The lots preserved in sawdust and in paper were not fit for consumption; the lot preserved in oats was suitable for cooking purposes only; the lot preserved in lime-water was the second best, and the lot kept in water-glass was of very good quality for stored eggs.

BEES.

The bees kept at this Station are hybrids between Italians and blacks. They are kept for commercial and for experimental work.

Commercial Work.—The production of honey from thirteen colonies was 872 pounds, or an average of about 67 pounds per hive. It sold for \$105 or a little over 12 cents per pound, which is somewhat more than \$8 per colony. The highest yield from one hive was 93 pounds and the lowest 18. The colonies ranged in weight from 61 to 73 pounds, averaging 65, after feeding, when put in the cellar, on November 2, 1917, whilst they ranged from 33 to 60 pounds and averaged 45 pounds, without the covers, when they were taken out in the spring, on April 23, 1918.

Experimental Work.—During two winters, some colonies have been fed with early-gathered honey, others with late-gathered honey, others with early-gathered honey and sugar syrup, and others with only sugar syrup. Contrary to expectations, the first mentioned did not come out of the cellar in better shape than the others; in fact, the lots fed on sugar syrup alone were about the strongest. This will be continued for a few years yet.

FIELD HUSBANDRY.

Work for this Division comprises crop management, soil management, and agricultural engineering.

CROPS, ROTATIONS AND EXPERIMENTAL WORK.

Crop Yields.—In the district they were lower than usual, with the exception of hay, and at the Station they were as follow:—

Crop.	Yield per acre in pounds.		
	1917.	Average.	For
Longfellow Corn..	18,235	17,039	6 years.
Good Luck Swedes..	16,782	29,375	6 "
Timothy Hay..	4,650	3,261	6 "
Clover Hay..	5,837	3,983	6 "
Banner Oats..	1,377	1,575	6 "
Manchurian Barley..	1,085	1,109	4 "
Huron Wheat..	1,733	1,718	3 "

Cost of production of field crops.—Since 1913, inclusive, accurate records have been kept for 70 acres, for the three main crops of the district, swede turnips, oats, and hay. It is easy to see how an increase in yield lowers the cost per acre, and *vice versa*, as shown in the table:—

1917, AVERAGE FOR 5 YEARS.

Crop.	Yield per acre.		Cost.	
	Lb.	\$ cts.	Lb.	\$ cts.
Good Luck swedes.....	16,782	5 98 per ton.	29,960	2 82 per ton.
Banner oats.....	1,377	0 54 per bush	1,944	0 37 per bus.
Timothy and clover hay.....	5,329	5 81 per ton.	4,613	5 68 per ton.

Rotation of Crops.—A three, a four and a six-year rotation have now been compared for seven years in succession. Each of these rotations has a hoed crop, followed by oats and then by hay for one, two or four years, according to the length of the rotation. Contrary to expectations, the most profitable one has been the six-year rotation, followed by the four-year, and then the three-year. This work will be continued to throw more light on the subject.

Experimental Work.—This has consisted in comparing different rates of seeding oats, also of seeding timothy with clover, of recording the yield of hay when the nurse crop had been sown at different rates, also the yield of hay after different kinds of grain:

Rates of seeding oats: Thirteen different rates, going up by a quarter of a bushel from 1 to 4, inclusive, have been tried during the last five years. The average for all was 1,868 pounds per acre: for the six rates below 2½ bushels, 1,760 pounds per acre; for the six rates above 2½ bushels, 1,929 pounds per acre; and for the standard rate of 2½ bushels, 1,914 pounds per acre. The latter should be adhered to until new light is thrown on the subject by a few more years' experimentation. This experiment has always been conducted on a sandy loam of good fertility.

Rates of seeding timothy and clover: Since 1912, inclusive, 126 plots of one-sixtieth acre each have been used for the experiment, on half of which 12 pounds of timothy, 8 pounds of red clover, and 2 pounds of alsike were sown per acre, with oats as a nurse crop, whilst the others only received half of these quantities. The thick seeding gave 8 per cent more hay. The soil is a sandy loam in very good heart and under a three-year rotation. This would tend to show that on land kept in shape by proper tilth and fairly well manured, it is not as important to sow large quantities of clover and grass seed as on poor soils badly worked.

SESSIONAL PAPER No. 16

Yield of hay when nurse crop is sown at different rates: For five years, oats have been sown at thirteen different rates from 1 to 4 bushels per acre, and the hay weighed the next year from each plot. The average crop of hay following the seedings above $2\frac{1}{2}$ bushels was 3,583 pounds per acre, that following the seedings below $2\frac{1}{2}$ bushels was 3,418, and that following the standard rate of $2\frac{1}{2}$ bushels per acre was 3,588.

Yield of hay with different nurse crops: Since 1912, inclusive, all the trial plots, 252 in number, were seeded down to timothy and clover. After barley, the crop of hay averaged 4,516 pounds per acre, after wheat 4,374, after peas 4,192, and after oats 4,011. This will be continued for a few years more, especially to check the results with peas.

SOIL MANAGEMENT.—The only experiment so far undertaken is in regards to the difference between spring and autumn ploughing in the cost of production and the yield of a crop of corn for ensilage.

Spring versus autumn ploughing for ensilage corn.—It is generally thought that spring ploughing is better for corn, especially if a sod is turned just before putting in the crop, so that there may be decaying vegetable matter to warm the soil and give easily available food to the young plants. But in a district where the season is very short, as much work as possible must be done in the autumn. Half of a field of about nine acres was thus ploughed in the autumn and the other half in the spring. The yield on the part ploughed in the autumn was at the rate of 9 tons 462 pounds per acre, and from the part ploughed in the spring 8 tons 1,854 pounds. Moreover the piece ploughed in the spring cost \$55.18 more than the other, mostly due to the weeds which required more work.

AGRICULTURAL ENGINEERING.—A great deal of work was done during 1917 at clearing land, draining, fencing, roadmaking.

Clearing Land.—Clumps of trees, bushes along fences, boulders, rocky and shaly mounds were cleared away. This facilitates the use of implements, and leaves no harbouring places for weeds.

Draining.—About 4,225 feet of tiles were laid, especially in newly cleared land near the Transcontinental railway; also a number of springy spots were attended to and drained into already existing systems.

Fencing.—Nearly 9,000 feet of wire fencing was put up, with posts fifteen feet apart and three feet in the ground. A good deal of this wire was used to replace the old, and it was unfortunately observed that the life of metal fencing is rather short.

Roadmaking.—A great deal was done at this in grading, filling, levelling, ditching, besides the concrete work necessary for retaining walls and culverts. Very soon, there will be drives all around the orchards, trial plots, paddocks, pastures, and experimental plots.

CEREALS.

The work with cereals includes test of varieties, the isolation of good strains, the growing of grain for hay, comparison of different mixtures for grain and the production of seed for sale.

Variety tests.—Nine varieties of spring wheat were tried; of all which have been on test for six years or more, Huron stands at the head with an average of 1,392 pounds per acre, and it took 101 days to come to maturity. Seven varieties of oats were tried; of all which have been on test for six years or more, Banner is at the top with an average of 2,327 pounds per acre, and it took 99 days to come to maturity. Eight varieties of two- and six-row barley were tried; of all which have been on test for six years or more, Manchurian seems to be best adapted to central Quebec. Five varieties

9 GEORGE V, A. 1919

of field peas were tried; of all which have been on test for six years or more, Arthur is the heaviest yielder with an average of 1.976 pounds per acre, and it took 97 days to come to maturity.

Isolation of good strains.—After five years of selection for Manchurian barley and Arthur peas, and six years for Huron wheat, the highest yielding strain of each was multiplied, and will be sown in the trial plots in 1918. The best strain of Manchurian was 16 per cent better than the checks, that of Arthur peas 18 per cent, and that of Huron wheat 8 per cent.

Growing of grain for hay.—The average of three years shows that when mixed hay from old meadows produced 3,655 pounds per acre, timothy 4,134, and clover 4,078, hay from Banner oats gave 5,380, from Ligowo oats 5,820, from Gold Rain oats 7,160, from Victory oats 7,200, from Banner oats and vetches 5,660, from Banner oats and Arthur peas 5,447 pounds. Oats alone, especially of varieties such as Victory and Gold Rain, yield the largest quantity of dry matter per acre, whilst the old mixture of peas and oats furnishes the most protein or the best hay to feed to dairy cattle, sheep and all young stock.

Mixtures for grain production.—Up to the present, the mixtures have not yielded more per acre than if the different grains had been sown alone. But this work will be continued with oats and barley, both for an early and a late crop; oats and wheat, also for an early and a late crop; and with oats, barley and wheat, the latter mixture being intended for poultry feed.

What influences cooking qualities of peas.—Arthur peas were sown in six different places to find if the soil or the preceding crop had any effect on their cooking qualities. It took two hours to cook them when they were sown on light land after a stubble, and the same time on heavy land after a stubble; 2½ hours on light land after a hoed crop; 3½ hours on heavy land after a hoed crop; 3½ hours on heavy land after grass; and 4½ hours on light land after grass. The soil did not seem to have much effect, but it is interesting to note that, on an average, it took 2 hours to cook peas grown after a stubble, 3 after a hoed crop, and 4 after grass. This experiment will be continued.

Production of seed for sale.—Banner oats, Huron wheat, Manchurian barley and Arthur peas are grown each year for seed production. The grain is of extra good quality or is not sold at all, and is shipped in sealed bags, so that no mixing or pilfering can take place during transit. Prices vary, according to the value of feed grain, and can be had on application. There was never yet nearly enough produced to satisfy all applicants, though hundreds of bushels are sold each year, and persons desiring to commence with first-class stock should give their orders early.

FORAGE CROPS.

Investigations with forage crops consist in the testing of varieties, the selection of good strains, seed growing and a comparison of different methods of helping the germination of mangel seed.

Variety tests.—Up to date, Longfellow has given the most satisfaction for corn, though other varieties give larger tonnage and may yet supersede it if they can come near enough maturity to make good silage. Of all varieties of swedes tried for seven years, Good Luck was the highest yielder with an average of 39,812 pounds per acre, whilst for carrots it was Mammoth White Intermediate with 16,231 pounds, and for mangels it was Giant Yellow Intermediate with 14,618 pounds.

Selection of best strains.—Work of this description was continued with Quebec Yellow corn. Seed was in great demand and was sent to distant points including Alberta and England.

SESSIONAL PAPER No. 16

Seed Growing.—Good Luck swedes and Quebec Yellow corn were grown for seed distribution and samples sent to applicants.

Helping the germination of mangel seed.—Fertilizer, also salt, mixed with the soil or sown in the row, soaking seed for twelve hours in water and in water with liquid manure, watering and packing soil were all tried, each six different times, with the result that the checks were practically as good as any method. Salt was injurious to the seed in all cases, also fertilizer, but the latter only when sown in the row.

FLAX.

An acre of flax was grown for fibre, and there seems no doubt that this crop should be grown only on very clean land, as it is extremely costly to pull the plants, which should not be cut, when weeds are numerous.

TOBACCO.

Five varieties of tobacco have been tried at Cap Rouge for a few years: Petit Havane, Canelle, Comstock, Belge, Connecticut. According to the Chief of the Tobacco Division, at Ottawa, only the first mentioned is early enough to succeed in this locality. Moreover, the tobacco manufacturers of Quebec do not care to use tobacco produced in this district.

FERTILIZERS.

There are now six projects under investigation, and 5 acres are devoted to this work: comparative values of different forms of nitrogen and phosphoric acid, manure versus clover as a source of humus, comparative value of different elements as supplements to farm manure, burnt lime versus ground limestone, value of ground seaweed as a fertilizer, comparison of different formulæ. Generally, a three-year rotation of hoed crop, grain, and clover is used so that the effects can be noted not only the year of the application of the fertilizer but also on the two subsequent crops. Nothing definite has been arrived at yet, and it may be said that this question of chemical fertilizers is a great deal more complex than most people believe.

HORTICULTURE.

The investigations in this division relate to fruits, vegetables, and ornamental plants.

FRUITS.

Variety Tests.—The fruits grown at Cap Rouge are apples, cherries, pears, plums, grapes, black, red and white currants, gooseberries, raspberries, and strawberries. There are 321 varieties under test and, especially for small fruits, it is already possible to tell which will do best in the district.

Cultural Work.—Different cover crops such as rape, clover, vetches, hay removed, hay left as a mulch, are tried, and the diameter of the trees having been taken for each lot at the start, the effect will be noted not only on the yield of fruit but on the growth of the trees.

Cost of establishing an orchard.—The object of this experiment is to find out how much it costs to establish an orchard of McIntosh apples. There are over four hundred trees, and Wealthys have been put in as fillers so as to get a few crops from them before the McIntoshes come into full bearing, when these will stand 35 feet apart in all directions. All expenses for materials, horse and manual labour are recorded.

9 GEORGE V, A. 1919

VEGETABLES.

Variety Tests.—Over 200 varieties are tested each year for yield, earliness, and quality.

Cultural Experiments.—There are some with beans, beets, cabbage, carrots, cauliflower, celery, onions, parsnips, peas, potatoes, rhubarb, tomatoes. They relate to thinning distances for roots, protection against maggots for cabbage and cauliflower, methods of blanching for celery, methods of forcing for rhubarb, comparing sets with plants and open ground seeding for onions, methods of training and staking for tomatoes, number of eyes, also plastering, for potatoes, comparing varieties of different degrees of earliness with one sown at different times for beans and peas.

ORNAMENTAL PLANTS.

Over one thousand varieties of trees, bushes, and plants are grown, and notes taken for each regarding foliage, flowers, size, growth, etc.

EXTENSION AND PUBLICITY.

The work for this Division consists in having exhibits at fairs and distributing literature.

EXHIBITIONS.

Products from the Station were sent to four exhibitions: Three Rivers, Quebec Provincial, Lotbinière County, Quebec Seed Fair. The space covered by exhibits formed a total area of 2,900 square feet. About 112,000 persons visited these fairs, and it was estimated that some 23,000 saw the installation from Cap Rouge. Two diplomas and a special prize were awarded to the Station exhibits.

PUBLICITY.

At the above fairs a great quantity of bulletins was distributed, and names were entered on the mailing lists. Besides, a large number of publications are sent on request and to the persons who receive seeds, plants, or trees, giving special information about growing what they get.

MISCELLANEOUS.

Distributions.—The following were distributed to farmers, members of survey work, and to the Illustration Stations: 1,480 eggs and 14 cockerels (Barred Rocks), 1,632 pounds Banner oats, 1,044 apple trees, 12 gooseberry bushes, 111 currant bushes, 324 raspberry canes, 4,000 strawberry plants, 624 perennial flowering plants, 300 roots of Good Luck swedes, 108 packages tomato seed, 612 packages flower seeds, 60 packages cabbage seed, 53 packages sweet corn, 47 packages garden peas, 38 packages garden beans, 9 packages field corn, 30 packages swede seed, 63 packages field beans.

Visitors.—Including the excursions at the Station, there were during the year 3,349 visitors, besides the large number of people who come, in the summer, on Sundays, when it is not unusual to see 100 during an afternoon.

Buildings.—A modern calf barn was started, and will be completed in 1918. Besides this, only urgently necessary repairs were made.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.
REPORT OF THE SUPERINTENDENT, J. A. McCLARY.

THE SEASON.

The severe cold weather throughout the winter of 1916-17 broke on the 24th of March, and the snow disappeared very rapidly, so that the first ploughing was done at the Station on the 18th of April and the first seeding on the 30th of the month.

The month of May was very cold, which retarded vegetation, but the ground being fairly dry and the weather cool, farmers were able to do their seeding under good conditions.

The excessive amount of rain in this district throughout the summer months made it very difficult for the farmers to harvest their hay and grain crops, and it was very detrimental to the potato crop, causing the potatoes to blight and rot badly in certain sections.

The weather during September was generally fair, enabling the farmers to finish harvesting their grain as well as most of their corn crop. There was a hard frost the night of the 22nd of September, which killed all tender plants.

There was not the usual amount of ploughing done in this district in the fall on account of the scarcity of labour, wet weather, and early frost, which prevented ploughing being done after the 10th of November. Snow fell on the 18th of November, and there was good sleighing on the 23rd of the month.

The winter of 1917-18 has been one of the severest ever experienced here. The cold weather throughout the winter seemed to break on the 17th of March, and there have been fine warm days the last of the month which have caused the snow to disappear gradually.

METEOROLOGICAL RECORDS.

Month.	Temperatures.					Precipitation.			Total Sunshine.
	Maximum.		Minimum.		Mean.	Rainfall.	Snowfall.	Total.	
1917.	Date.	Degree.	Date.	Degree.	Degree.	Ins.	Ins.	Ins.	Hours.
April.....	21	63	11	13	37.96	1.24	.....	1.24	106.7
May.....	31	77	22	26	45.38	2.25	.....	2.25	136.0
June.....	13	84	7	40	60.21	7.38	.....	7.38	174.3
July.....	23	90	7	40	67.61	3.97	.....	3.97	216.1
August.....	1	92	27	45	65.12	8.27	.....	8.27	204.8
September.....	27	79	23	24	52.78	1.78	.....	1.78	188.1
October.....	19	67	23	23	42.19	5.43	.....	5.43	81.1
November.....	18	49	27	-13	25.12	0.18	0.87	1.05	95.6
December.....	21	40	30	-45	5.74	.....	2.55	2.55	68.1
1918.									
January.....	12	37	23	-45	2.16	.....	2.20	2.20	70.7
February.....	20	49	2	-33	9.75	0.57	1.20	1.77	75.6
March.....	31	57	11	-25	22.72	.....	1.60	1.60	153.7
Total.....						31.07	8.42	39.49	1570.8

LIVE STOCK.

Horses.—This Station now has nineteen horses, five registered Clydesdale mares, twelve well-graded work horses, one driver and one registered Clydesdale foal.

Three of these mares were wintered in a yard with a box stall to run into. They were fed on a ration of 20 pounds of hay, 30 pounds corn silage, and 2 pounds bran each per day. These horses wintered well, considering the economical ration which they had.

9 GEORGE V, A. 1919

Cattle.—The Ayrshire herd which is installed in the new dairy barn consists at present of 13 cows, one 2-year-old bull, two 2-year-old heifers, seven yearling heifers, and nine calves.

This herd is headed by the 2-year-old bull Gardrum Bold Boy—47138—purchased from the Nova Scotia Agricultural College, from one of the highest milk producing cows in their herd. The breeding of this bull is considered to be of the best in regard to milk production, conformation, and size, his dam making over 16,000 pounds in her last lactation period.

Beef Steers.—There were wintered at this Station ninety-one steers in order to consume the silage and hay raised on the farm, and at the same time to ascertain the profit in steer feeding. These cattle will be sold the first of May.

Sheep.—There are at present at this Station ten registered Oxford ewes, five registered Oxford lambs, one registered Oxford ram, also thirty-two grade Oxford ewes and twenty-five grade Oxford lambs.

The clip of wool was sold in the spring of 1917 through the Sherbrooke County Sheep Breeders' Association, after being graded at Lennoxville, for 56½ cents per pound. There were also sold, through this organization, in the fall, seventeen lambs at 14¾ cents per pound and ten aged ewes for 9¾ cents per pound.

FIELD HUSBANDRY.

Rotations.—The only rotation work this Station has so far under operation is the general four-year rotation, that is the ploughing of sod and planting of corn and roots, followed with grain seeded with 9 pounds of red clover, 2 pounds of alfalfa, and 10 pounds of timothy per acre, followed with clover hay, two crops being taken off. Part of the second crop, when the season is favourable, is used for seed purposes, and the balance put into silos for ensilage. This use of the silo has given very good results the past two years, permitting the saving of this valuable crop if the weather is not favourable for drying, and making with it one of the most nutritious foods that can be had for dairy cattle, beef, sheep, and swine.

Crop Yields.—The hay crop was an average one, this Station having 260 tons. Sixty-five acres of oats were sown. Thirty acres of this being on a very rough piece of land which was underdrained the fall before and broken, only yielded 20 bushels per acre. Thirty-five acres which was on corn stubble had an excellent growth until it was struck with a heavy storm before ripening, causing it to lodge very badly. The yield on this area was 32 bushels per acre.

Forty acres were planted to Indian corn for silage purposes. The season being very wet, the yield was only 12 tons per acre, but the four large silos at this Station were filled by adding 30 tons of clover.

FORAGE CROPS.

Roots.—Fourteen varieties of swedes were tested, the Invicta giving the highest yield of 20 tons 150 pounds per acre, the lowest being Kangaroo, 12 tons 125 pounds.

Four varieties of fall turnips were tried, the Cow Horn being the largest yielder, 14 tons 1,350 pounds per acre and the Yellow Aberdeen Purple Top the lowest with 8 tons 1,300 pounds.

Nine varieties of mangels were under test, the Giant Yellow Intermediate giving the highest yield of 16 tons 450 pounds, and Prize Mammoth Long Red the lowest with 11½ tons.

Three varieties of sugar beets were planted, the Russian sugar beet giving 8 tons 500 pounds per acre, the lowest being Klein Wanzleben yielding 5 tons 1,750 pounds.

SESSIONAL PAPER No. 16

Five varieties of carrots were also under test, the White Belgian giving 14 tons 1,315 pounds per acre and Giant White Vosges 10 tons 900 pounds.

Rape.—Three varieties of rape were tested in rows 30 inches apart, the Dwarf Essex yielding 12 tons 1,250 pounds and Thousand Headed Kale 10 tons 1,200 pounds per acre.

Indian Corn.—Eleven varieties of Indian corn were tested. In the dent varieties, Essex Dent yielded 15 tons 1,315 pounds, the Howie being the lowest with 12 tons 1,071 pounds. In the flint varieties the Early Longfellow topped the list with 18 tons 396 pounds per acre and Quebec Yellow was the lowest yielder with 11 tons 1,038 pounds. With the excessive amount of rain which fell throughout the growing season, all varieties of corn and roots did not develop, yield, and mature as they would have in an average season.

Alfalfa.—This Station has not been able to accomplish much with alfalfa yet. What has been sown in plots broadcast is very delicate, and much of it does not seem to survive the winters. What has been planted in drills 24 inches apart has done far better and gave a very fair growth the past season, which demonstrates very conclusively the importance of cultivation with this forage crop. About two pounds of alfalfa seed per acre is always used in connection with clover and timothy in seeding down for the field crop of hay, with the object of endeavouring to inoculate the soil in a small way for the growing of this crop.

HORTICULTURE.

The past season was decidedly a poor one for horticultural work. The late spring and cold, wet, backward summer greatly hampered progress. In many places great difficulty was experienced in tillage operations in the early part of the season and, as the season advanced, conditions were very little improved because of the impossibility of keeping up cultivation in consequence of the torrential rains which occurred with such frequency. The season was cut short by the occurrence of a very severe frost September 22, when all tender stuff was killed.

That serious damage resulted from the ravages of fungous diseases need only be supported by the fact that the potato crop was only about 50 per cent of the average crop of former years. The blight affected the potato tops in the latter part of August, and in a very short time the whole of the crops of the countryside were killed. The killing of the tops was followed by the rotting of the tubers, which very greatly cut down the already comparatively small yield.

So far as can be ascertained, the majority of the farmers are determined to spray their potato crops with Bordeaux mixture as a control for late blight. This movement has arisen from results obtained on experimental plots which were established and conducted at various places throughout the district.

In the raspberry plantation the amount of cane blight was considerably less than during the previous season.

Tree Fruits.—The possibility of developing orchards in this part of the Eastern Townships has been the subject of much discussion. However, the success of the venture has of late been very gratifying. The twenty-four and a half acres of orchard which are comprised of the best commercial varieties of apples, suitable for Quebec conditions, seedlings from the Central Experimental Farm, and plums, cherres, and pears from the various nurseries, have up to the present made most satisfactory growth and are in excellent condition.

9 GEORGE V, A. 1919

Bush and Cane Fruits.—Very gratifying results were obtained from the bush fruits in 1917. They all yielded well considering that the plantation was started the spring of 1915.

Black Currants.—Twelve varieties. Of these the following three seemed to give most decidedly the best results as to yield, size and quality of fruit: Saunders, Climax and Buddenburg.

Red Currants.—Twelve varieties. The following three seemed the most outstanding as to yield, quality and size of fruit: Red Grape, Lee's Prolific and Victoria Red.

White Currants.—Three varieties. They are given in order of merit: White Cherry, White Grape, Large White.

Gooseberries.—Ten varieties. The yields from these bushes were small.

Red Raspberries.—Six varieties. King, Herbert, and Brighton gave the best results.

Propagation.—A considerable number of cuttings from the different varieties of currants and gooseberries were planted. They made satisfactory growth during the season, developing into quite good plants. They are to be used in connection with the distribution work.

Strawberries.—Thirty varieties of strawberries have been under test. The results obtained from the common varieties have been very satisfactory. However, the everbearing sorts have not proved to be a very great success.

Vegetables.—The variety and cultural tests conducted with the various varieties of vegetables furnished some very interesting results, thereby serving as an excellent demonstration to the many visitors that came to the Station.

Tests were conducted with the following vegetables: Cabbage, cauliflower, brussels sprouts, onions, beets, peppers, egg plant, leeks, carrots, parsnips, turnips, salsify, radishes, lettuce, celery, squash, pumpkin, corn, melons, citron, tomatoes, potatoes, peas and beans.

Vegetable Seed Growing.—A considerable quantity of vegetable seeds was grown during the past season, including the following: Cabbage, parsnip, beets, onion, radish and tomato, also beans, peas, and corn. These seeds were distributed to those applying to this Station.

Ornamentals.—The shrubs and perennial borders planted the fall of 1916 along the south and west sides of the main lawn wintered well.

The shrub border, which is along the west side of the lawn, did very well during the summer, but the perennial border, which is at the south side of the lawn, was rather a disappointment in some respects. The land is of a heavy texture, being very wet and cold, consequently many of the flowers died during the early part of the summer. These were replaced and hopes are being entertained for their success another year.

Bulbs.—The tulip beds proved the source of much favourable comment, and were a great attraction in the early part of the season.

Annual Flowers.—In the annual flower garden there was great profusion of bloom from the early part of July until the frost came, September 22.

All varieties did extremely well, excepting the asters. The sweet peas blossomed very freely. It was noted that peas that were sown April 17 were more vigorous and flowered more freely than those sown May 8 and 13 respectively. Peas started in the hotbeds, although satisfactory, did not compare with those sown out-of-doors at an early date.

SESSIONAL PAPER No. 16

Perennials.—A large number of varieties of perennials were grown in nurseries. They serve a double purpose. First as a base of supply for the borders and to secure continuity of bloom, and (2) to obtain seed for the distribution work. These perennials were a great centre of attraction for the great volume of visitors that came to the Station during the summer. That perennial flowers are becoming popularized in these districts is evidenced by the fact that there is a growing demand for the seed grown and distributed from this Station each year.

Seed Distribution.—There had been a very great demand for all varieties of seeds grown. Three hundred collection packages of seeds were sent out, the collection consisting of garden peas, sweet corn, tomatoes, five varieties of perennial and two varieties of annual flower seeds. Applications have also been accepted for 700 samples of potatoes, which will be distributed in the month of April, of the Green Mountain, Irish Cobbler, and Rose of the North varieties.

A distribution is also being made of 100 packages of strawberry plants, of 25 plants each, and 100 packages of small bush-fruit cuttings which will go forward in the month of April.

FARM IMPROVEMENTS.

There was an artesian well drilled in the months of July and August, 385 feet deep, with a capacity of 2,000 gallons of water per hour for the supply of the water system at this Station.

Buildings.—In September there was started the erection of a new dairy building located over the artesian well, which is situated very near the new dairy barn. The size of this building is 40 feet by 26 feet. The basement, which is of concrete, 8 feet high, will accommodate the two large pneumatic tanks for the water system, the dimensions of which are 5 feet by 20 feet, and also the electric motor and deep-well pump for said system. The upper part of this building will be used as a small dairy, with operating room for churn, separator, and butter workers, wash-room, boiler-room, and a small cold storage plant.

There was also erected at the new dairy barn this season the second silo, 18 feet by 30 feet.

There is under erection and not yet completed for the poultry branch at this Station, one hen house 16 feet by 32 feet for the accommodation of one hundred hens, and a poultry administration building 22 feet by 26 feet, the concrete basement to be used for incubator room and egg room, etc. The upper story will be used as an office, bed-room for attendant, and storage for feed. These buildings are located on the flat near the public road being the nearest farm buildings to the town of Lennoxville.

Fencing.—Two hundred rods of 48-inch high No. 9 galvanized wire fencing was erected on farm roads and around the new school grounds on the northeast corner of the farm.

Clearing land.—The rough pasture land which was drained in 1916 and ploughed for the first time in the fall was worked and got into as good shape as possible. This swamp promises to be one of the most fertile parts of the farm.

Roads.—There was started by this Station in the month of October, the building of a farm road on the east side of the farm extending from the northeast to the southeast corner. A considerable amount of work was done in grading, culverts were put in place and, through the winter, gravel was drawn and piled to be used for said road.

This road is not only built for the Farm, but for the accommodation of the rural district which is located south of it, to enable the children to attend the new Consoli-

9 GEORGE V, A. 1919

dated Model School of the township of Ascot which is being built on the northeast corner of the farm. This school is being erected by the Ascot township at a cost of \$24,000, and it is bound to be a great asset to the rural district.

Outside of this, there was considerable gravelling on other farm roads, as gravel and the King log drag seem to be indispensable in the up-keep of country roads.

MEETINGS.

On the 22nd of August there was held the third annual summer Farmers' Day at this Station, which was attended by over 1,500 people from all parts of the Eastern Townships. There seems to be a large increase in the attendance and interest shown in these gatherings since the Farm was established.

The staff at the Farm has attended throughout the year a number of meetings in different parts of the district in connection with Farmer' Clubs and Agricultural Societies and other meetings organized by the Lennoxville Station. The meetings have been well attended and much interest and good-will shown.

VISITORS.

A very marked increase is noticed in the number of visitors, especially through the summer quite a number of small gatherings of a few farmers from different neighbourhoods coming by auto, and spending a few hours looking over the work of this Station.

Through the winter months there seemed to be a great interest taken in the livestock work, especially the recently installed Ayrshire herd and new dairy barn; also in the sheep, beef cattle and horses.

EXPERIMENTAL STATION, SPIRIT LAKE, QUE.

REPORT OF THE FOREMAN-MANAGER, PASCAL FORTIER.

THE SEASON.

The season of 1917 was one of the most unfavourable for crop production since the opening up of the district.

The winter of 1916-17 was exceptionally cold, with but little snow until March and April. The severe winter was followed by a long, late spring. There was still snow on the ground, and the lakes were still frozen over, during the first half of May.

The heavy rainfall during the latter part of May and through June hindered seeding until the 11th of the latter month. Operations were continued during the rest of the month although, the land being sometimes spongy in character, it was not as well prepared as was desired. It was hoped that the weather would be more favourable in July and August, but rains or cloudy weather continued five days out of seven, until November.

However, there was a fair prospect of a crop on those areas not flooded out but on the night of August 19-20 a heavy frost cut down potatoes and all garden crops. The first snow fell on September 8, and there were heavy frosts almost every night

SESSIONAL PAPER No. 16

that month; the cold and snow prevented from ripening most of the grain which had survived the rains, and part of the grain crop had to be left in the field, although cut.

The winter of 1917-18 has been normal, snow fell in abundance from November on, and the cold has been steady up to the end of March.

LIVE STOCK.

Horses.—There are 20 horses on the Station, made up of 18 heavy draught and two drivers. The above number includes five mares, one Percheron and four Clydes.

The cost of feed for the horses during the year was 40 cents per horse per day. This is higher than usual owing to the necessity of buying practically all feed used.

Cattle.—Three milch cows are now at the Station, two Holsteins and one Ayrshire.

Swine.—Three Yorkshire sows and one Yorkshire boar were sent here from the Central Farm in October last.

Poultry.—The flock numbered 29 at the close of the year, the breeds kept being Wyandotte and Plymouth Rock.

FIELD CROPS.

One hundred and fifty-two acres were sown in the spring of 1917, of which 125 acres were in oats. The yield was 125 bushels of grain and 25 tons straw; the rest was either drowned out before maturity or left in the field owing to continued wet weather at harvest time. One hundred acres of the oat land were seeded down to timothy, red clover, and alsike. These grew well, and promise a good hay crop in 1918.

Twenty tons of hay were harvested. Its quality, however, was poor, owing to the wet weather.

Wheat, barley, flax, and hemp did not succeed well owing to the wet season. The wheat (Marquis) reached a height of from $3\frac{1}{2}$ to 4 feet, and the heads were well filled at harvest time but on account of wet and frost it was not harvested.

One half-acre of potatoes was planted on June 20.

CLEARING.

During the year 25 acres were got ready to burn over, and 40 acres ready to plough. Forty acres more require about two weeks' work to be ready for seeding.

HORTICULTURE.

The apple trees in the nursery grew well, as did the seedlings, but about 15 per cent of the former and 35 per cent of the latter were winter-killed. Forty-two seedlings were planted in their permanent location in the fall, as well as a further lot of apple trees and of raspberry bushes received from the Central Farm.

In vegetables the following were tried: Tomatoes, cabbage, cauliflower, celery, parsley, onions, leeks, lettuce, beans, beets, Brussels sprouts, carrots, corn, parsnips, peas, squash, turnips, citrons, melons, cucumbers. Although not sown in the hot-beds until May, all grew well until destroyed by the frost of August 20.

In a normal season there is every reason to believe that vegetables will do well in this district.

Flowers.—In spite of a late spring and early frost, flowers generally did well, most annuals remaining in bloom up to October 10. Sixteen varieties of poppy received from Ottawa were planted in the nursery for the time being.

Ornamental Trees.—From the Central Farm, 396 trees were received and planted in the nursery in October, as well as a large shipment received from the Chief Forester

9 GEORGE V, A. 1919

of the province of Quebec, and comprising white elm, white plane trees, sugar maples, white ash, red oak, and European larches.

During the winter hundreds of loads of moss, which had been collected by the prisoners of war before the internment camp was closed, were hauled on to the parade ground, which it is planned to convert into a lawn, with flower beds, ornamental trees and shrubs, etc.

FARM IMPROVEMENTS.

A stone basement, with cement floor, was put under the barn, and some necessary improvements and repairs made to the houses on the Station.

A total of 5,250 feet of drains was dug. These drains are 5 feet wide and 6 feet deep.

EXPERIMENTAL STATION, KAPUSKASING, ONT.

REPORT OF THE FOREMAN-MANAGER, SMITH BALLANTYNE.

THE SEASON.

Conditions during the season were very unfavourable throughout the district, it being one of the most backward seasons recorded for years in northern Ontario. The snow did not disappear until towards the middle of April, and during the remainder of that month and May there was a continual rainfall, which prevented early cultivation of the land.

Seeding could not be commenced at the Station until the 29th of May, and it was as late as June 15 before it was completed. Owing to the excessive precipitation and the cold weather, the crops failed to mature rapidly, and as early as August 29 there was a heavy frost that destroyed all the vegetables, and on September 6 a killing frost that destroyed all the grain and cereals, which were only in the milk stage at that late date.

LIVE STOCK.

Horses.—There are fifteen draught horses at the Station which are employed constantly, clearing the land, grading roads, and hauling firewood, besides doing the general farm work, while during the past winter they have been hauling pulpwood and the timber used at the mill during its operation at this Station.

Dairy Cattle.—The herd comprises sixteen head, thirteen of which are grade Ayrshire and three grade Holstein. There are also four yearling Holsteins and seven heifer calves. One thoroughbred registered Holstein bull heads the herd.

Beef Cattle.—Twenty-eight steers of a first-class beef type were purchased at Winnipeg in December, costing 9½ cents per pound. They were carried along with roughage for two months and now are being finished off with clover, timothy, and gluten meal, showing remarkable gains, and when sold a reasonable margin of profit is hoped for.

Swine.—There is one registered Yorkshire boar and one sow at the Station, but as yet there is no young stock, so that no experimental work in feeding or pork production has been carried on.

FIELD HUSBANDRY.

No crop rotations have as yet been established, owing to the necessity of preliminary work in clearing the land.

Owing to the heavy frosts that killed all the crops no grain matured so that it could be used for seed.

SESSIONAL PAPER No. 16

Over one hundred and ten acres of land was sown with oats; only about six acres of this matured. Five acres were sown with O. A. C. barley and gave every indication of a heavy crop; small patches ripened on the well-drained areas. A large area of Marquis wheat, which should have been a fair crop, was destroyed in the milk stage.

The heaviest crop at the Station was a mixture of Arthur peas and oats. This was cut green and fed to the stock.

FIELD HUSBANDRY.

There were two plots of 8 acres each sown in fall wheat and rye, this grain was sown on August 29 and 30, 1917, and made remarkable growth until the winter set in, when it was well protected by a heavy fall of snow.

This crop came through the winter in good condition, and indications promise a good crop of both.

FORAGE CROPS.

Six 8-acre plots were sown in grass on land that had just been cleared of standing timber and that had not been stumped or burned over. The plots were sown with varied mixtures of timothy, blue grass, red and white clover, meadow fescue, western rye, Kentucky blue grass, orchard grass, and alfalfa. The catch on the different plots was a very good one. The total area will be used as pasturage the coming season for cattle. Six plots of two-thirds of an acre each were sown in red clover, timothy, and alsike, with and without nurse crop and in drills 30 inches apart. All plots did extremely well, and it was hard to determine which of the plots proved most satisfactory, as an experiment, but the coming season will prove which method of seeding is the most adaptable to this country.

The root crop this season was a failure owing to the extremely wet spring and the very late date at which seed was sown; hence no tests as to the relative merits of varieties could be made.

HORTICULTURE.

Tree Fruits.—There are now 168 seedlings in the nursery, all of which made a remarkable growth during the past season, and are ready for setting out in permanent rows, this season.

The currants and small fruits, although few in number, gave an average yield, while the Herbert raspberry did extremely well. The small fruit field last year, in spite of the unfavourable weather conditions, did well, demonstrating the fact that this climate, owing to the rapid growth during the short summer season, will be very suitable to the production of small fruits.

Vegetables.—Variety tests were carried on with beans, lettuce, onions, celery, corn, cucumbers, parsnips, cauliflower, and cabbage. The tender vegetables suffered from the frost, but the hardier varieties, with few exceptions, did well.

Two and one-half acres of well-cultivated land were planted in potatoes with untested seed of unknown variety. The total yield from the plot was 150 bushels. The failure of the crop was characteristic of the district being caused by poor seed, weather conditions, and early frosts.

Ornamental Gardening.—A few varieties of annual and perennial flowers and bulbs were planted during the season, and did very well, but no variety tests were carried on or seeds saved, but during the coming season, when the grounds are laid out, it is planned to investigate the varieties of flowers suitable to this district.

A number of flowering shrubs and ornamental trees, which arrived at the Station late last fall, were trenched for the winter, and will be laid out in attractive design on the new lawn which will be made around the foreman-manager's house this coming season.

9 GEORGE V, A. 1919

FARM IMPROVEMENTS.

Buildings.—The new dairy barn, with accommodation for forty head of cattle, was completed; this barn is equipped with forty stanchions of the Beatty type. In addition to the above there were constructed in the horse barn, seven pens for calves and bull.

A new 2 $\frac{1}{4}$ -ton Fairbanks scale with a 37-inch by 47-inch platform was installed in the feed room.

The foreman-manager's house was erected and completed, being ready for occupancy in March.

A temporary implement shed was erected for the protection of farm implements and machinery.

Clearing Land.—One hundred acres of land were cleared and ploughed for the spring crop of 1918.

Another block of 128 acres were cleared of standing timber, from which was taken 1,500 cords of pulpwood and 200 cords of fire-wood.

During the past winter, bush activities kept the teams busy, hauling logs to, and lumber from, the mill, where 150,000 feet of lumber was sawn to be used for building purposes on the Station.

Drainage.—During last season over 1,100 feet of drain were laid. This work was done as economically as possible, employing plough and scraper for back-filling wherever possible.

It is hoped to demonstrate the value of drainage, especially to virgin soil, this spring, by being able to sow the crops much earlier, which is of vast importance in this district, with its short season; this should prove of great value in greater production.

Fibre.—Two plots of $\frac{1}{10}$ of an acre each were sown in hemp and flax; the hemp showed a remarkable growth, attaining a height of 4 feet 6 inches, but 6° of frost on September 6, destroyed both.

EXPERIMENTAL STATION, MORDEN, MAN.

REPORT OF THE ACTING SUPERINTENDENT, E. M. STRAIGHT.

THE SEASON.

The seasons vary much in southern Manitoba. Not much can be gathered from one's former experiences, for the unexpected usually happens. The ground was ready for work early enough, but killing late frosts were common, causing the re-seeding of some crops and the absolute destruction of others. Frosts were early in the autumn also so that the season, shortened from both ends, was unable to mature many of the vegetables. The flowers also made a poor showing, owing to a combination of cut-worms, dry weather, and frost. For the cereal crops, however, the weather was fairly favourable, and normal yields of these were harvested, despite the drought in August. The snowfall was very light. The ground was bare for much of the time, and partly so throughout the winter. Temperatures as low as forty below zero were registered, when there was not snow enough to afford any protection. After the first of March the thermometer was below zero for only two days, and above sixty for two days during the same month.

LIVE STOCK.

Horses.—Twelve horses are kept at the Station. The work horses are grade Clydesdales for the most part, and for the entire season were kept in excellent condition.

SESSIONAL PAPER No. 16

Cattle.—Thirty steers of fair quality were purchased in 1916 and divided into two lots for a feeding trial to compare the finishing of steers in a barn with those finished in a single-board shed and corral protected by a board fence. The weather in January and February was very severe, and the steers in the open shed at that time seemed to make very slight gains. However, they gained rapidly in early spring, and finished well. Both lots were outstanding on the Winnipeg market at time of sale.

The first cost of steers was \$6.50 per hundred, and the selling price was \$11.50 per hundred, the profit over feed of the lot fed in the barn was \$589.81, and of the lot fed in the shed \$541.77, a difference of \$48.04; but the difference in interest on investment in buildings in favour of the open shed was \$53. Hence, if the extra profit from the inside lot was more than counter-balanced by the difference in interest on money invested, then the extra depreciation and insurance on the expensive building would be largely loss.

Sheep.—The experiment to determine the value of rusted wheat sheaves in place of hay for pregnant ewes was completed. These sheaves produced no ill effect; all ewes remained in good condition and gained slightly in weight, and the lot on rusted wheat sheaves led the rest. The present flock consists of seventy-five breeding ewes and twenty lambs. Fourteen experimental feeders were maintained on the farm until March 26, when they were sold at 11 months of age at an average price \$19.31 each.

FIELD HUSBANDRY.

Owing to the fact that the work of the Station had been carried on for so short a time, no definite rotation of crops could be adopted. The chief work has been to rid the farm of weeds by means of the summer-fallow, and at the same time to produce such crops as were possible. Thirty acres were seeded to Marquis wheat during the last week of April. The germination was excellent, and 539 bushels of wheat were harvested. The straw was short, owing to continued drought in mid-season, as above reported. This wheat will be used as seed for a 60-acre block in 1918. Some effort was made to prepare this wheat for seed distribution also, but, because of wild oats which were present in some quantity, it was found that the amount of work necessary to separate these thoroughly from the wheat would not pay.

Forty-eight acres of oats were threshed. These yielded 1,081 bushels. In addition to this, 35 acres of oats were cut for hay.

About 24 acres of barley were sown, and 630 bushels harvested. No large area was in hay. About 20 acres of Western rye grass and red clover was cut once, and about 9 acres of alfalfa cut twice. From this area about 70 tons of prime hay were harvested.

Some 14 acres were planted to field corn. The germination was not very good, so that the yield was light. As there is yet no silo on the farm it has not been thought well to extend the corn area, as the present amount seems to be about all that can be fed to advantage.

HORTICULTURE.

Having in mind the development of hardy strains of apples, small fruits, and vegetables for prairie conditions, considerable attention has been given to horticulture at this Station. The area given to this branch of the farm work, consists of about 90 acres, and is being rapidly utilized. A new orchard of about 10 acres was set out in the spring of 1917, consisting of forty-five new varieties of apples, six of plums, and a number of hardy pears from Professor Hansen. These were protected so far as possible by means of hedges of the *Caragana arborescens*, laurel-leaved willow, and sunflowers. Clean cultivation was followed in the orchard until the middle of July, when rape was sown. A few bush fruits were also set out, but made a poor showing.

9 GEORGE V, A. 1919

Vegetables.—The season for vegetables in this section was not favourable. All of the more hardy types were grown to some extent, but the showing was not so good as in 1916, with the exception of potatoes. These yielded fairly well, and the Early Ohio, one of the leading sorts here, as well as others, were of good quality.

Ornamental Gardening.—Considerable quantities of perennials were sown in the nursery, in anticipation of future needs. No permanent planting of these has been thought advisable until the Station buildings are erected and driveways definitely decided upon.

POULTRY.

No poultry has been kept at the Station so far, but it is a line of work which it is hoped to develop in the near future.

BEEES.

Two colonies of bees were obtained in the spring, and made normal development during the summer. About 65 pounds of honey were sold. Two colonies went into winter quarters weighing approximately 65 and 77 pounds. As there was no good location for cellar wintering on the Farm, they were placed in a wintering case in a sheltered position out-of-doors. During some of the mild days in March of 1918, the bees obtained a flight and promised well for the season.

FARM IMPROVEMENTS.

Buildings.—A granary was completed during the summer, and proved to be a serviceable building. The barn roof was shingled, and other minor repairs made on the same building. A root cellar in connection with the horticultural work was completed, and a large quantity of potatoes stored. During the trying weather of January, it seemed impossible to keep the frost out of this cellar, so that much damage was done to the vegetables therein. The sheep shed which was in the course of construction during the summer was much delayed because of bad weather, but at the end of March it is nearing completion.

Fencing.—The fencing on the farm is now almost complete. Eight-foot cedar posts and No. 9 Page woven-wire fencing have been used. Two strands of barb wire have been used above the woven wire. This arrangement has given a very excellent and satisfactory fence.

MACHINERY.

Not much new machinery has been purchased. For the work being done, the present equipment has been found fairly satisfactory.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

The season of 1917 was a most unfavourable one for crop growing in Manitoba. The spring was late, and seeding was from two to three weeks behind normal time. This was followed by extreme drought and late frosts. Much of the seed sown did not germinate, and a great deal of what did grow was frozen back by the June frosts. The total rainfall up to the end of August was 3.94 inches, which is the least

SESSIONAL PAPER No. 16

for the growing period in the history of the Farm. Wheat stood the unfavourable weather the best of any, and yielded from one-half to two-thirds of normal. Other grains were less than half a crop, and forage crops were still more seriously affected by the drought.

METEOROLOGICAL RECORDS.

Month.	Highest Temper- ature F.	Lowest Temper- ature F.	Mean Temper- ature F.	Total Rainfall.	Total Snowfall.	Hours Bright Sunshine.
1917.	°	°	°	Inches.	Inches.	Hours.
April.....	56.0	13.0	32.1	.....	11	147.7
May.....	93.0	19.8	47.1	0.14	.....	293.5
June.....	96.9	26.0	58.1	1.76	.....	227.7
July.....	101.2	32.5	67.2	1.26	.....	283.7
August.....	94.0	29.0	62.2	0.78	.....	271.8
September.....	90.4	21.2	55.1	1.68	.....	179.1
October.....	71.0	2.0	31.8	0.14	8	110.2
November.....	61.0	15.0	33.3	0.10	$\frac{1}{2}$	123.2
December.....	34.9	-40.0	-6.3	.....	4	86.2
1918.						
January.....	28.5	-41.0	-4.6	.....	3	93.0
February.....	39.5	-38.0	0.9	.....	9	132.3
March.....	64.2	-6.5	28.0	0.07	6	167.3
Total.....	.....	.....	.....	5.93	41 $\frac{1}{2}$	2,115.7

LIVE STOCK.

Horses.—There are twenty-one horses on the Brandon Farm. Of this number, four are pure-bred Clydesdale mares, two of which are in foal, the other two being exceptionally good yearling and 2-year-old mares. Owing to building operations on the horse and cattle barns not being completed until well into the winter, it was impossible to conduct any experimental work that time of year.

Cattle.—An experiment was conducted with some steers to determine the value of silage in the ration. The steers were divided into two equal lots of eleven steers each, one lot receiving grain, hay and silage, and making average gains of 140.6 pounds each at a cost of \$13.40 per 100 pounds gain; and the other lot which received grain and hay only made average gains of 143.7 pounds each at a cost of \$15 per 100 pounds gain. Another experiment was conducted comparing the feeding ability of high-grade steers as compared with ordinary steers such as are sold as feeders in the stockyards. The high grade steers made average gains of 239.1 pounds at a cost per 100 pounds gain of \$14.24, and showed a labour income and profit per steer of \$22.76, with a labour income and profit per \$100 invested in steers and feed of \$21.45, while the ordinary steers made average gains of 216.1 pounds at a cost per 100 pounds of \$15.71 with a labour income and profit per steer of \$20.89, and a labour income and profit per \$100 invested in steers and feed of \$22.11.

There are at present forty-one head of registered Shorthorns and four grades in the herd. One Shorthorn cow—Ottawa Janet 4th—gave 12,087 pounds of milk during the past year, but failed to calve in time to qualify in the Record of Performance.

The cost of raising a heifer from birth to one year was found to be \$60.49, and from raising a heifer from one year to two years the cost was \$37.40. This is very high and is due to the increased cost of all classes of feeds.

Sheep.—The grading up of range ewes with a pure-bred Oxford Down ram was continued during the past year, and there is now a very good flock of high-grade Oxford Down ewes as well as some good pure-breds.

9 GEORGE V, A. 1919

The wool clip averaged 9.25 pounds per sheep, as compared with 9.2 pounds for the previous year. The lamb crop was good, averaging 1.25 lambs per ewe.

Swine.—Berkshires and Yorkshires are the breeds kept, and a number of experiments were carried on during the year. A comparison of pasture versus dry lot feeding was made. Two equal lots of pigs, twenty in each lot, were fed the same ration except that one lot had access to good pasture and the results clearly proved the value of pasture, as the lot on pasture gained at a cost of \$6.17 per 100 pounds, while the dry lot cost \$7.01 per 100 pounds. This made the return per acre from the pasture amount to \$26.38. Another experiment was carried on to determine the feeding value of pigweed seeds when fed to hogs. The pigs were divided into three equal lots of ten pigs in each lot. One lot which was fed crushed barley and feed flour made a total gain of 294 pounds at a cost of \$10.40 per 100 pounds gain. Another lot received crushed barley and boiled pigweed seed, and made a total gain of 175 pounds at a cost of \$14.02 per 100 pounds gain. The third lot received crushed barley, feed flour, and boiled pigweed seed and made a total gain of 268 pounds at a cost of \$12.50 per 100 pounds.

An experiment to determine the value of grade A screenings as compared with other feeds was carried on during the winter. The pigs used were upwards of 100 pounds in weight, and, owing to the very high price of the other feeds, the screenings compared very favourably with them. Lot 1, which received crushed screenings alone, made gains at a cost of \$10.10 per 100 pounds. Lot 2, which received crushed barley alone, gained at a cost of \$20 per 100 pounds. Lot 3, which was fed equal parts of feed flour and screenings, gained at a cost of \$18.70 per 100 pounds. Lot 4 was fed equal parts of shorts and screenings and gained at a cost of \$13.80 per 100 pounds, and lot 5, which was fed equal parts of shorts and barley, gained at a cost of \$15.40 per 100 pounds.

POULTRY.

Two breeds of poultry are kept, the Barred Plymouth Rock and the White Wyandotte. The birds are housed in portable colony houses, each house accommodating thirty hens. There are various makes of incubator used, and all are giving fairly good hatches. The chicks are brooded in one of the colony houses, using a large coal brooder, which has proved very satisfactory. Crate-fattened cockerels gave much better returns than others fattened while allowed to run loose in the pen. Grade A screenings has been successfully used in the place of other grains, principally wheat and barley, which had become very high priced. Better results were obtained by using it in the dry mash than by feeding it whole.

BEEES.

Thirteen fairly strong colonies came through the winter and continued to do well during the spring, but the absence of bloom, owing to the extreme drought, made the honey crop very light and necessitated heavy feeding before the hives were put into the cellar in the fall. No swarms issued during the summer.

FIELD HUSBANDRY.

Rotations.—The following rotations have been under test at this Farm for a number of years:—

“D”, four years’ duration (wheat, wheat manured, oats, summer-fallow): This is purely a grain-growing rotation, except that manure is applied every four years.

“E”, four years’ duration (wheat, wheat, oats, summer-fallow): This is exactly the same as “D” except that no manure is applied and is a typical grain-growing rotation.

“F”, five years’ duration (wheat, wheat, corn or roots, oats or barley, clover hay): This is a mixed farming rotation suited to conditions where it is desired to grow both a large amount of wheat and a large amount of fodder for stock.

SESSIONAL PAPER No. 16

"G", six years' duration (wheat, wheat, oats or barley, clover hay, pasture, corn or roots): This is also a mixed farming rotation and allows for pasture for stock as well as cropped land.

"H", six years' duration (wheat, wheat, summer-fallow, oats, hay, pasture): This rotation provides both grain crops and hay crops but omits hoed crop.

"I", six years' duration (flax, oats, summer-fallow, wheat, hay, pasture): This rotation is of similar character to "H" but substitutes flax for one of the wheat crops.

"Q", eight years' duration (roots and peas, wheat or oats, hay, hay, pasture, pasture, green feed and rape). The land used in this rotation is light and gravelly and is therefore used as a sheep farm.

"W", ten years' duration (wheat, wheat, corn or roots, oats, barley, alfalfa, alfalfa, alfalfa, alfalfa): This rotation is adapted to a dairy or pure-bred stock farm where the chief object of crop growing is the production of a large quantity of good fodder.

The table which follows shows the average cost per acre of operating these rotations, including rent, use of machinery, and all the cost of handling the land and producing the crop (but not marketing). It also shows the average return per acre, and the resultant profit. These figures are based on normal pre-war prices; if present prices were used, much larger returns and profits would be shown:—

Rotation.	Cost per Acre of Operation. Average of 5 years.	Returns per Acre. Average of 5 years.	Profit per Acre. Average of 5 years.
	\$	\$	\$
"D".....	10 01	12 85	2 87
"E".....	8 37	11 39	3 02
"F".....	12 16	18 41	6 25
"G".....	11 94	19 36	7 42
"H".....	8 54	12 11	3 57
"I".....	8 47	12 94	4 47
"Q".....	7 61	9 51	1 90
"W" (3 years only).....	11 39	19 99	8 60

Cultural Experiments.—Deep ploughing is giving rather better results than shallow, though the figures obtained are not as conclusive as would be expected.

One ploughing of summer-fallow is giving equally as good results as two and means less work.

The substitution of a pasture crop for bare fallow has reduced the following wheat crop. June ploughing of summer-fallow has proven much better than July.

In seeding down grasses, better results have been obtained where seeding has followed corn or summer-fallow, than where grain was the previous crop, and the larger the number of preceding grain crops, the greater the difficulty in getting a good catch.

Better catches are obtained without a nurse crop than with but not enough better to pay for the loss of the grain crop.

In breaking up sod of tame grasses and clovers, best results have been obtained by breaking in July immediately after removing the hay crop and working as a summer-fallow during the remainder of the season.

In the application of barnyard manure on stubble land for growing wheat, oats or barley, best results have been obtained with all three grain crops by applying in the fall and ploughing in. The same result was also obtained in manuring for corn.

The substitution of grain crops ploughed in for green manure instead of bare summer-fallow resulted in a decrease in yield. Where the green crops were ploughed

9 GEORGE V, A. 1919

in early in July the yield was practically the same as on summer-fallow land, but later-ploughed green-manured land wasted too much moisture.

The results of a very extensive system of experiments with soil packers have been very inconclusive.

Seeding at various depths from one to four inches has not resulted in any definite conclusions.

The application of commercial fertilizers of various types has brought no return commensurate with cost.

CEREALS.

The usual tests of varieties of grain were conducted. Marquis wheat continues to show its superiority over other kinds under test, yielding 36 bushels 10 pounds per acre of wheat weighing 64½ pounds to the measured bushel. Banner oats gave the highest yield this year and has the highest five-year average. Results in barley were rather contradictory to results of previous years. Mackay peas have the highest yield both for 1917 and for five-year average.

FORAGE CROPS.

The yields of forage crops were the lowest in many years, as they suffered the most from the drought of any type of crop. Northwestern Dent corn was the highest yielding, with a crop of 8 tons 1,125 pounds of green fodder per acre. Leviathan sugar beet was the highest-yielding mangel, and Durham the highest-yielding turnip. Carrots and sugar beets were also tested. Grasses, clovers, and mixtures were tested for hay production, and as usual the different strains of alfalfa exceeded all other kinds. Western rye grass was the most productive grass. A new set of grass and clover plots was sown. Among annual crops for hay production, oats cut green gave best results.

HORTICULTURE.

A large number of varieties of vegetables were tested for the purpose of determining the most suitable sorts for this climate. Also cultural tests for the obtaining of information on the best methods of growing of different kinds of vegetables, were conducted. The season was unfavourable for vegetables, and the crop was below average.

Fruit bushes and trees gave poor results; much of the bloom was destroyed by spring frosts, and the drought interfered with the development of fruit.

The flowers and trees on the grounds were not as attractive as usual, but demonstrated what could be done under drought conditions.

BUILDINGS.

New cattle barn, horse barn, and general utility buildings were erected to replace those lost by fire. They were completed during the winter of 1917-18, and have now been occupied. They are proving very satisfactory for the purposes for which they were built.

EXHIBITIONS.

No exhibition work was undertaken on account of lack of buildings in which to store and prepare exhibits.

MEETINGS.

The Superintendent addressed the annual meeting of the Manitoba Dairy Association on "Growing Winter Feeds for Dairy Cattle," the annual meeting of the Agricultural Fairs' Association on "The Work of the Experimental Farms," and the Potato Conference held in Winnipeg in February, 1918, on "Methods of Potato Growing for Manitoba." He also spoke at a number of farmers' meetings held at various places throughout the province. His assistant gave some help to the Manitoba Agricultural Extension Service in the holding of short courses, giving lectures and demonstrations on live stock at several of their short course schools.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE SUPERINTENDENT, W. H. GIBSON, B.S.A.

The precipitation during the growing season of 1917 was unusually light and insufficient for the maximum production of cereal and forage crops. The seasonal rains were not general over the province and, as a result, in many parts of southern Saskatchewan the grain crops were comparatively light. Spring opened late with seeding general May 6 to 8. Pasture, hay, and forage crops were light, resulting in a scarcity of feed and the marketing of a large percentage of thin, unfinished cattle.

METEOROLOGICAL RECORDS.

Month.	Temperature.					Rainfall.		Snowfall.		Total Sun-shine.
	Maximum.		Minimum.		Mean.					
	Date.	°	Date.	°	°	Days.	Ins.	Days.	Ins.	hours.
January.....	8	40	31	−43	− 7.00	.....	.....	7	14.50	39.2
February.....	6	34	2	−50	− 5.75	.....	.....	4	10.00	85.6
March.....	29	36	3	−30	14.97	.....	.....	4	4.25	111.8
April.....	22	49	1	2	31.83	2	0.40	2	7.00	136.8
May.....	15	86	29	20	49.55	3	0.41	.....	.....	300.4
June.....	8	86	20	28	55.27	10	2.67	.....	.....	214.2
July.....	27	104	1	33	66.03	6	1.36	.....	.....	320.7
August.....	13	89	27	33	60.32	7	1.83	.....	.....	269.2
September.....	22	87	8	20	52.73	3	0.71	.....	.....	175.8
October.....	1	66	21	4	31.13	1	0.14	4	12.50	106.9
November.....	8	60	26	8	34.27	.....	.....	2	5.00	112.8
December.....	17	35	14	−38	− 9.19	.....	.....	7	10.00	35.7
						32	7.52	30	63.25	1,909.1

LIVE STOCK.

Horses.—The horses at Indian Head number twenty-three head, twelve of which are pure-bred Clydesdale mares and fillies. Much interest is manifested in the horse-breeding operations at this Farm. Already a number of pure-bred mares have been imported into the district. Horse-breeders' clubs have been organized under the Federal scheme with a view to improve the horses of the section.

The usual experiments were conducted relating to the cost of keeping work horses, cost of wintering idle horses, together with the cost of raising fillies to two and three years old. The costs are as follows: heavy draught horses, 1,600 pounds and over, \$131.38 per annum; general-purpose horses, 1,200 pounds and over, \$119.46 per annum; Clyde filly, 2 to 3 years old, \$54.78 per annum; two Clyde fillies, 1 to 2 years old, \$51.28 per annum.

Cattle, Shorthorns (Dual-purpose).—The entire herd numbers forty-six head, three stock bulls and forty-three females. The herd is handled strictly along dual-purpose lines. Rigid selection is practised, and only females conforming to beef type and milk production are retained in the herd. These cows are bred to sires of the very best blood lines that can be obtained. Already a number of heifers have freshened which bid fair to outclass their dams at the pail. Many inquiries are received for young bulls of the dual-purpose type and, as a consequence, the surplus are readily sold at good prices.

Forty-five grade Shorthorn steers were purchased in the fall of 1917 and divided into three lots for the purpose of gaining data relative to the value of the different

9 GEORGE V, A. 1919

kinds of shelters for the winter feeding of steers in Saskatchewan. The shelters under consideration are stable, open corral with high board fence, and shed with open front and southern exposure. From experiments concluded, the question of buildings need not deter a man from entering the live-stock business. It has been demonstrated time and again by the Experimental Farms that cattle do relatively better outside than when housed in expensive barns. Where natural shelters are not available, a corral with a high board fence, about 7 feet high, and a rough, straw-covered shed will be found very beneficial as a protection from the stormy weather. These shelters are easily and cheaply constructed on the average farm, and will be found most satisfactory for all classes of live stock. Through the agency of live stock, the rough feeds and low-grade grain can be profitably utilized.

Sheep.—The flock numbers ninety-five head pure-bred Shropshire and grade sheep. The grading experiment with range ewes and pure-bred rams was continued. Feed costs of the entire flock were kept throughout the winter. The average cost of wintering pure-bred Shropshire ewes was \$5.50; pure-bred Shearling ewes, \$5.13; grade Shropshire ewes, \$4.06; grade Oxford ewes, \$4.20; grade ewe lambs (mixed lot), \$2.98.

Swine.—The entire herd numbers fourteen head, six York sows and one York boar, six Berk sows and one Berk boar. Preparations are under way for more extended work with hogs.

POULTRY.

The breeds of poultry maintained on the Farm are White Wyandottes and Barred Plymouth Rocks. These breeds are well adapted to prairie conditions. The total number of eggs laid during the winter months, October to March 31, was 8,491. The average cost of production per dozen for the winter months was 21.75 cents and the selling price 40.70 cents per dozen, leaving a net profit of 18.95 cents per dozen.

Trap-nesting was carried on throughout the winter months, and individual records of all hens and pullets kept.

During the year 810 chickens were hatched by artificial incubation.

Ninety-six cockerels were crate fed for three weeks, and realized a total profit of \$22.25.

Work with poultry is expanding rapidly. Many inquiries are received for hatching eggs and breeding stock.

FIELD HUSBANDRY.

Investigational work in field husbandry is mainly with rotations and cultural methods. In connection with the rotations, records are kept to ascertain the cost of production of the different field crops and the suitability of the rotations to southern Saskatchewan conditions.

The following rotations are under investigation:—

Rotation "C"—three years' duration (summer-fallow, wheat, wheat). In the grain growing districts this rotation is generally practised.

Rotation "J"—six years' duration (summer-fallow, wheat, wheat, oats seeded down, hay, pasture).

Rotation "P"—eight years' duration (summer-fallow, wheat, wheat, summer-fallow, hoed crop, barley seeded down, hay, pasture.)

Rotation "R"—nine years' duration (summer-fallow, hoed crop, wheat, oats, summer-fallow, wheat, oats seeded down, hay, pasture).

Rotations "J", "P" and "R" are well suited to mixed farming and stock raising.

Crop Yields.—The yields of wheat varied between 21 bushels and 20 pounds per acre on stubble land and 47 bushels and 42 pounds per acre on summer-fallow. Oats—43 bushels and 22 pounds and 99 bushels and 6 pounds per acre. Barley—20 bushels and 57 bushels 34 pounds per acre. Flax—9 bushels 20 pounds and 12 bushels 20 pounds per acre. Field peas—18 bushels and 35 pounds per acre.

SESSIONAL PAPER No. 16

Cultural Experiments.—Experiments in the various methods of treating land so as to obtain the highest yield and yet retain the fertility of the soil have been carried out on the Indian Head Farm for a number of years. Below are comments on the more important results obtained.

Deep ploughing, e. g., 6 to 8 inches, gives ample compensation for the extra labour entailed, and the result is more prominent in the second crop, as is the case with subsoiling, but with the latter the increase in yield does not compensate for the extra expense.

Ploughing summer-fallow twice is not necessary when the land is ploughed early and for depths varying from 6 to 8 inches.

Autumn ploughing of stubble materially increases the yield, while there is no advantage in stubble burning. For oats, fall cultivation and spring ploughing are advised.

The best time for applying manure is in autumn on first-year stubble, and plough under immediately.

The timely use of the packer and harrow after ploughing will conserve moisture and increase the yield.

Seeding to a depth of 3 to 4 inches places the seed in contact with the moisture, and ensures the germination essential to a large yield.

Seeding down to hay is best done after a hoed crop or summer-fallow, either with or without a nurse crop.

For breaking sod, plough early and work as summer-fallow.

CEREALS.

The regular work with cereals was conducted on uniform test plots of fallow and stubble land. Twenty varieties of spring wheat, twelve of oats, nineteen of barley, seven of peas, and three of flax were tested. Marquis headed the list of named varieties of wheat with an average of 48 bushels per acre. Victory was the highest yielding oat, with 129 bushels and 14 pounds per acre. Danish Chevalier, the highest yielding barley, gave 63 bushels and 16 pounds. Golden Vine peas yielded 30 bushels and 40 pounds. Premost flax gave 11 bushels and 40 pounds per acre.

FORAGE CROPS.

The regular experiments were carried on with forage plants. However, owing to unfavourable seasonal conditions, the yields were considerably lower than in previous years. A 15-acre field was sown to peas and oats June 22, cut in the early dough stage, and filled into the silo. This mixture makes an excellent feed for cattle, and may be used as a substitute where corn cannot be grown successfully.

The varieties of corn most suitable for the Indian Head district are North West Dent, Early Longfellow, and Compton's Early. Free Press, Gehu, and Quebec Yellow are earlier but do not produce so much forage.

Roots.—Twenty-seven varieties of turnips, eleven of mangels, ten of carrots, and three of sugar beets were tested. In addition, four varieties of soiling crops were grown. The yield for the season was about normal.

Clovers and Grasses.—Investigations are under way to ascertain the comparative values of the different hays and pasture grasses. Alfalfa is well adapted to the soil and climatic conditions of Saskatchewan. The most suitable varieties are Grimm and Baltic.

HORTICULTURE.

Fruits.—The fruit crop was a complete failure, caused by spring and summer frosts. Cross-bred and Standard apple trees were almost all badly winter-killed, possibly owing to the heavy growth of wood, which was not matured when winter set in.

Vegetables.—The usual variety tests and cultural experiments were carried on during the season. The potato crop was not heavy in yield but the quality was exceptionally good.

9 GEORGE V, A. 1919

Ornamental Gardening.—Annual and perennial flowers gave a good show of bloom, while bulbs were very poor, having been received too late the previous fall.

Trees and ornamental shrubs came through the winter in good condition. A few of the more tender varieties were slightly winter-killed on account of the growth of the previous season not being matured. No bloom was produced by any but a few late varieties of lilacs.

BUILDINGS.

During the year a permanent poultry house, 16 feet by 32 feet, was erected with accommodation for 100 hens. A permanent brooder house, 16 feet by 45 feet, with eleven hovers, was also built. The sheep barns were moved to a permanent site and remodelled, facilitating future work in sheep husbandry.

EXHIBITIONS.

In order to cover as much territory as possible, the exhibition work was divided into two circuits, circuit No. 1 visiting towns in the southern part of the province on the Weyburn-Estevan line. Circuit No. 2 worked on the main line between Moosejaw and Moosomin. The exhibits attracted much attention, particularly at the smaller fairs.

EXPERIMENTAL STATION, ROSTHERN, SASK.

REPORT OF THE SUPERINTENDENT, WM. A. MUNRO, B.A., B.S.A.

THE SEASON.

The effects of the hailstorm of August 3, 1916, were very evident throughout the season of 1917 on the shrubs and trees. Many of the leaders in the evergreens had been broken, and careful pruning and training were necessary to bring a lateral into place to retain the former shape of the tree. Most of the poplars were killed back several feet, but none was killed outright. The plum and apple orchards were badly killed back, and had to be severely pruned. The raspberry canes had all been killed, and the growth of 1917 being all new canes there was no crop last season.

The precipitation of 1917 was above the average and well distributed throughout the season, as a consequence of which all crops were above the average.

METEOROLOGICAL RECORDS.

Month.	Temperature F.			Total Precipita- tion.	Total Sunshine.
	Highest.	Lowest.	Mean.		
1917.				(Inches).	(Hours).
April.....	48.0	−3.8	30.015	1.21	184.5
May.....	89.3	22.8	52.085	0.32	336.1
June..	82.3	27.7	56.0	3.42	287.6
July.	87.8	40.7	65.76	1.16	395.3
August.....	87.4	37.7	60.235	1.94	300.8
September.....	84.3	22.7	52.975	0.64	216.0
October.....	66.9	−3.1	33.69	0.75	152.6
November.....	58.0	8.7	34.24	0.13	170.9
December.....	18.7	−51.3	−14.5	2.2	64.5
1918.					
January.....	33.0	−45.3	−7.4	1.4	87.6
February.....	37.3	−42.5	−0.9	0.4	146.0
March.	53.2	−26.8	20.35	3.5	142.6
Total.....				17.07	2,484.5

SESSIONAL PAPER No. 16

LIVE STOCK.

Horses.—There are sixteen horses on the farm, two of which are drivers, and five of which are in foal. It is generally considered that four work horses are necessary for a quarter-section on an ordinary farm but on the Station the work has been kept well in hand with fourteen work horses per section, although at times the work was somewhat strenuous. The horses were stabled at night but were out at a straw stack during the day all winter.

Cattle.—Sixty steers were purchased in October, forty of which were two and a half years old and in fair flesh, and twenty, three and a half years old and in good flesh. The younger steers cost \$7.75 per hundred pounds, and the older \$9 per hundred. They were all fed oats and barley chop and barley straw at the same rate per thousand pounds weight of steers, and twenty of the younger steers were fed from 5 to 10 pounds of turnips daily in addition. The older steers sold for a higher price than the younger, but not sufficiently higher to warrant the spread in the cost. The small amount of roots fed was well repaid in the increase in weight and the better quality of those fed the roots.

There are now two Holstein cows, one 2-year-old heifer, one 2-year-old bull, and one 1-year-old heifer, all pure bred, and two cows, two 2-year-old heifers, and three 1-year-old heifers, all grade Shorthorns, on the farm.

Sheep.—One hundred range ewes were purchased in December, 1915, for \$1,000. By December, 1916, approximately \$800 of wool and mutton had been sold, and there were 114 ewes on hand. By December, 1917, there had been sold during the year approximately \$1,200 of wool and mutton, and there were 122 ewes in the flock. Leicester rams were used on these ewes.

Hogs.—A start was made in hogs in December, 1917, by obtaining six young sows and a boar of good Berkshire breeding.

FIELD HUSBANDRY.

Winter rye on small plots has been tried on the Station for several years without a failure (except once from hail in 1916) and this in the case of both early and late sowing and late and early pasturing. In July, 1917, oats and winter rye were sown together, and a small crop of green oats cut from it in the same autumn with a most promising crop of winter rye coming through the winter.

All grain crops were above the average in yield in 1917.

Owing to changes in the rotation fields due to the extension to the Station, there was no information to be derived from rotation work in 1917.

FORAGE CROPS.

Rye Grass.—Hay, principally all rye grass, has been grown in rotations for eight years, and in only two seasons have there been good yields. But in the spring of 1918 the good effects of such work on the soil were seen when the soil on farms all around drifted, while there was no drifting where rye grass had been grown on the Experimental Station.

Corn.—The corn of 1917 was a failure owing to early fall frosts. There have been only two good fodder corn crops in eight years.

Alfalfa.—Attempts were made to grow alfalfa broadcast without much success, but a crop in 1917 from seed sown in rows 24 inches apart gave a good yield and promises well for permanency.

Roots.—Turnips furnish the best succulent crop grown in this district. Mangels germinate poorly, and carrots are still more expensive in thinning and harvesting than are the turnips.

HORTICULTURE.

Fruits.—Red, white, and black currants have given very satisfactory yields every year since they began fruiting. Gooseberries have never yielded, and raspberries have always done well till 1917, which failure was due to the killing of the canes by hail in 1916. The plum orchard has not yet come into bearing, but the fact that there are a number of plum orchards in the district giving good yields is sufficient evidence that there are good prospects for plum culture. The apple orchard was too severely injured by hail in 1916 to give any showing of fruit in 1917. The strawberries came through the winter in good condition, and yielded the best in 1917 of any season since the Station started.

Vegetables.—All garden roots, cabbage, brussels sprouts, kale, peas, and beans always do well here, and yielded extra well last year. Squash and tomatoes are doubtful crops; although in 1917 they did well. Tomatoes must have a good start in the hot-bed or the house, and then, after transplanting to the open, must be trained to one stalk and kept upright by being tied to a stake or to a trellis. Celery has been tried for a number of years in trenches and on the level, with results always in favor of level planting. Celery was stored in a cool cellar, and kept in good condition till March.

Ornamental grounds.—The climate is too dry to produce such a thick growth on the lawns as in moister climates, although Kentucky Blue grass and White Dutch clover give very satisfactory results. The trees and shrubs are improving in appearance every year, and now form a splendid background to the flower border. The show of flowers is very attractive, from the tulips in May till the asters are frozen in the autumn.

FARM IMPROVEMENTS.

Buildings.—A granary 30 feet by 60 feet, 12 feet high, was built in October. This has an 8-foot driveway down the centre with two 20-foot bins, four 10-foot bins, a 20-foot sample room and a 20-foot work room. This will form accommodation for grain not held by the four 12-foot by 16-foot portable granaries.

Fencing.—Four and one-half miles of fencing were constructed in 1917. This was of woven wire eight strands on 8-foot cedar posts placed $3\frac{1}{2}$ feet in the ground.

Roads.—There were $4\frac{1}{2}$ miles of road graded, which gives ready access to any part of the farm.

EXHIBITIONS.

A large Experimental Farms exhibit was prepared and sent in charge of a competent man to eight fairs throughout the northern part of the province. Much favourable comment was received on the merits of this display.

EXPERIMENTAL STATION, SCOTT, SASK.

REPORT OF THE ACTING SUPERINTENDENT, M. J. TINLINE, B.S.A.

THE SEASON.

The weather during April was unusually cold, spring opening up very late. Seeding commenced on the last day of the month, and with the soil in an unfit condition for cultivation. Dry weather during May permitted rapid progress with seeding, but spring frosts in May and June injured and retarded the growth of grain crops. When dry weather set in it brought the weeds on more rapidly than the grain, resulting in many very weedy fields. The drought continued all through the balance of the summer, the total rainfall for the six growing months only amounting to 4.86

SESSIONAL PAPER No. 16

inches. This is considerably less than one-half the average amount. Crop yields of all kinds were light, and in some sections almost a failure. From the experimentalist's standpoint the season was fairly satisfactory, since it was a good year to bring out the most vigorous varieties, and to show the best cultural methods for conserving moisture.

On the Station a large field of wheat yielded an average of 25 bushels per acre. Oat yields were not so satisfactory, although some of the best fields had given promise of fair returns. Potatoes and root crops gave lighter yields than usual. Very little fall ploughing was done in the district, owing to the dry autumn.

METEOROLOGICAL RECORDS.

Month.	Temperature F.			Precipitation.			Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	
1917.	°	°	°	Inches.	Inches.	Inches.	Hours.
April.....	48.8	5.0	31.8	0.52	0.49	1.01	134.0
May.....	89.4	19.2	51.26	0.39	0.02	0.41	300.7
June.....	90.0	25.6	55.0	0.88	.....	0.88	294.1
July.....	94.0	37.2	65.2	1.03	.....	1.03	363.0
August.....	90.0	34.7	59.7	1.16	.....	1.16	284.2
September.....	85.8	23.0	52.2	0.37	.....	0.37	180.4
October.....	69.2	— 4.0	33.8	.....	0.12	0.12	126.6
November.....	64.8	1.2	36.7	0.25	.....	0.25	151.1
December.....	27.8	—43.8	—11.8	.....	0.55	0.55	67.8
1918.							
January.....	37.0	—42.8	— 4.69	.....	0.77	0.77	62.5
February.....	38.2	—43.0	2.93	.....	0.49	0.49	111.1
March.....	60.0	—25.2	20.6	.....	0.57	0.57	168.1
Total for the year.....	.....	.....	.....	4.60	3.01	7.61	2,243.6

LIVE STOCK.

Horses.—There are seventeen head of horses on the Station. Of these, seven are home-bred grade Clydesdales. Experiments to determine the cost of raising colts and the cost of feed for work horses have been continued.

Cattle.—One milch cow is kept to supply milk to the employees on the Station. Two cars of fat steers used in the feeding experiments in 1916-17 were sold on May 20, at a profit over feed cost of \$16.75 per steer for the lot fed inside a straw shed, and \$12.57 per steer for the lot fed in an open corral. A carload of feeder steers was purchased on September 27, at a cost of 7 cents per pound. These have been used in testing out methods of housing.

Sheep.—The flock of sheep on the Station has been maintained at 100 breeding ewes. Only a fair lamb crop was secured, but, with the high prices for mutton and wool, the return values have been most encouraging, the total sales alone amounting to \$515.72.

Swine.—Six brood sows and one boar of the Berkshire breed constitute the foundation stock for the Station herd. The first litters were farrowed in August and September, with an average of seven pigs per litter. These young pigs wintered over in a straw shed and came out in the spring in a good, thrifty condition. The brood sows were fed 5 pounds each per day of meal, and slept in small, portable cabins.

9 GEORGE V, A. 1919

POULTRY.

A commencement with poultry was made. Two pens of 50 birds each of the Barred Plymouth Rock breed were secured; one pen were late-hatched pullets, the other 2-year-old hens. A comparison is being made to determine the egg production, fertility of the eggs, and "livability" of the chicks from the two pens.

FIELD HUSBANDRY.

Rotations.—The comparative tests with the several rotations started on the Station in 1911 continue to furnish some valuable data on the cost of production of field crops, as well as on the best arrangement of crops.

Crop Yields.—Marquis wheat on summer-fallow yielded 25 bushels per acre. On new land, Banner oats yielded 45 bushels per acre, Ligowo oats 41 bushels, and O.A.C. No. 21 barley 34 bushels.

Cultural Experiments.—Five rates of seeding and five dates of seeding grain crops were tested. Lighter seeding than is commonly practised gave the best returns, and sowing about May 1, the heaviest yields. Ploughing down rotted manure has continued to show a good profit. The average increased yield for three years when wheat was sown on manured land was 6 bushels per acre; when oats were sown, 21 bushels; and when barley was sown, 15 bushels.

Further cultural experiments under way are: Prairie breaking, summer-fallow and stubble treatment; seeding down to grass and clover; breaking up cultivated grasses; testing out soil packers; depths of seeding and seed-bed preparation.

Cereals.—Fifteen varieties of wheat, eight of oats, ten of barley, seven of peas, four of flax and four of rye were tested. Varieties under trial on the Station for the first time were Kitchener wheat, Alsdorff oats, and three varieties of barley, Charlottetown No. 80, Albert 0-54, and Stella 0-58.

The yields of wheat on the test plots varied from 9 bushels 50 pounds to 21 bushels 6 pounds, Kitchener giving the heaviest yields. With oats, the yields ran from Daubeney with 29 bushels to Victory with 57 bushels per acre. The Charlottetown No. 80 barley gave a yield of 21 bushels per acre while Success, the beardless sort, only yielded 12 bushels.

In all, forty-nine farmers purchased seed grain at the Station during the year.

FORAGE CROPS.

Indian Corn.—Thirteen varieties of Indian corn were tested. The yields were light, Salzer's North Dakota again giving the heaviest yields. Longfellow and Northwestern Dent yielded but little less.

Roots.—Twenty-nine varieties and strains of turnips were tested, the yields averaging from 270 to 575 bushels per acre. Of the ten varieties of mangels grown, Giant Yellow Half Long yielded 451 bushels per acre, the lowest yielding variety giving 363 bushels. The average yield from three varieties of sugar beets was 333 bushels per acre, and from six varieties of carrots 130 bushels.

Grasses and Clovers.—Yields were secured from eight kinds of hay crop and from eight combinations of hay crop. Of these, Western rye grass by itself gave the heaviest yields, with western rye grass and red clover second. The red clover when sown alone winter-killed.

Alfalfa, in rows 30 inches apart, gave heavier yields than alfalfa sown in rows 6 inches apart. Two cuttings were secured from the plot of sweet clover. A fairly comprehensive set of experiments was started with grass and clover during 1917. Thirty-two one-fortieth acre plots were seeded down, the objects being to test out the quantities of seed to use and the best method to follow in seeding down. Of the annual hay crops, oats, vetches, and peas gave the best returns, and broad-leaved Essex rape the heaviest yields of the five soiling crops used.

SESSIONAL PAPER No. 16

HORTICULTURE.

Fruits.—The orchard destroyed during 1915-16 was replanted with seedlings from hardy standard apples. Only trees showing indication of individual hardiness were used. The native plum trees made a good growth, notwithstanding the drought.

Of the small fruits, the Dakota strawberry yielded well; the Senator Dunlap being later, was affected by the dry weather. Black currants fruited well, but the crop of red and white kinds was light. The yields from the raspberries were much lower than usual and the berries quite small.

Vegetables.—A good crop of the hardy kinds of vegetables was harvested. The success with this class of crop was largely due to the moisture stored in the soil during the previous season by summer-fallowing. Of the more tender sorts a good crop of green tomatoes was secured.

Potatoes.—The experiments with potatoes have shown the importance of planting earlier than is commonly practised and the advisability of using larger-sized sets. Early maturing sorts have also proved to be the most satisfactory for table use. The profits per acre from potatoes after deducting the cost of seed, labour, and rent of land each year, has for three years been between \$70 and \$80.

Ornamental Gardening.—The Russian poplar (*Populus Petrowskyana*) is proving to be one of the hardiest and most rapid-growing trees on the Station. Two kinds of evergreens that are thriving well are the white spruce (*Picea alba*) and lodgepole pine (*Pinus contorta Murrayana*). The Caragana hedges have made a splendid growth, and are protecting the orchard to a considerable extent.

In the tests of annual flowers, a greater number than usual were sown directly in the flower beds, and a comparison made with flowers sown in hotbeds and transplanted. Paeonies, delphinium, scarlet lychnis, of the perennial flowers, made a good showing and thrived well.

FARM IMPROVEMENTS.

One permanent poultry house for 100 birds was erected; also three smaller portable houses. A poultry administration building was also constructed. A roadway through the Station was opened up and fenced. Several small fields near the sheep barn were fenced in to test the value of different crops for pasture.

EXHIBITIONS.

The circuit for the Scott exhibit was arranged to cover the northern half of northwestern Saskatchewan. The fairs visited were Unity, Saskatoon, Macklin, Kerrobert, Lloydminster and Lashburn.

MEETINGS.

During the summer months the usual number of farmers' picnics were held on the Station. Eight hundred persons were estimated to have attended one of these gatherings. In the winter season, the Superintendent visited a number of Grain Growers' Associations, and discussed some of the experiments conducted on the Station.

VISITORS.

The influx of automobiles has resulted in a marked increase in the number of visitors. It is estimated that 3,300 persons visited the Station during 1917-18.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.
REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

THE SEASON.

The conditions at the beginning of the season of 1917 were extremely promising, especially during April and the greater part of May. The prospects at that time were fully as good as during the record-breaking season of 1915, because of the extremely liberal amount of moisture that was carried over in the soil from the fall of 1916, coupled with the fact that the frost did not draw out of the ground as early as is usual, thus avoiding the customary excessive evaporation that takes place during the windy weather in the latter part of March and throughout April.

The winter of 1916-17 was rather severe. There was a cold dip in the latter part of December, 1916, when the thermometer went to 36 degrees below zero. The thermometer dropped to 41 degrees below zero in both January and February, and the weather during March was steadily cold although there were no very low dips.

Frost did not thaw out of the ground until well into April. Work on the land was not possible until the week beginning the 9th. Owing to the excessive amount of moisture in the soil, farmers generally found that it was not possible to proceed with seeding as rapidly as usual owing to the fact that in nearly all fields there were low spots that were too wet to work till the 20th or 25th of the month. So, owing to the fact that spring opened up ten days to two weeks later than is usual in the district, coupled with the fact that the low spots were too wet to work and that the precipitation during the month was somewhat greater than the average, there was not nearly as much seeding finished by the end of April as is customary, and a large part of the wheat seeding had to be done in May and was not completed till the 20th.

The favourable conditions from the moisture standpoint started all crops well, but the drought during May and June was disastrous, and only those crops sown on summer-fallow in the greater part of the district from Lethbridge east were able to stand it. The total rainfall, as measured at the Station from April 1 to the 3rd of August, was only 5.31 inches. Considering this small amount, the yields of grain that were obtained are certainly remarkable, and must be attributed in large measure to the fact of so much moisture being held over in the subsoil from the fall before.

The last frost in the spring was on June 4, when 1 degree was registered, and the first frost in the fall was on September 5, when 2 degrees were registered. In the following table will be found data regarding the weather during the year:—

METEOROLOGICAL RECORDS.

Month..	Temperature F.			Precipitation.	Sunshine.
	Maximum.	Minimum.	Mean.		
1917.		°	°	Inches.	Hours.
April.....	61.0	11.5	38.0	1.57	133.1
May.....	81.0	16.0	49.0	0.95	224.3
June.....	82.0	31.0	55.9	1.42	384.5
July.....	93.0	38.0	66.7	1.37	400.7
August.....	89.0	35.0	61.3	2.00	321.3
September.....	85.0	27.0	54.5	1.67	197.3
October.....	79.0	6.0	41.5	0.72	137.4
November.....	70.0	16.0	44.6	0.00	177.6
December.....	55.0	-31.5	- 8.2	1.13	62.5
1918.					
January.....	60.0	-34.5	13.8	0.46	75.1
February.....	54.5	-41.0	17.4	0.76	124.8
March.....	67.5	-10.0	32.3	0.66	162.5
				12.71	2,401.1

SESSIONAL PAPER No. 16

LIVE STOCK.

Horses.—The horses on the Lethbridge Station number fourteen, and include two pure-bred Clydesdale mares. Two grade colts were foaled in 1917.

Cattle.—The usual feeding tests were carried on during the winter of 1917-18. Thirty-eight 2- and 3-year-old range steers were purchased in December, 1917, for \$8.31 per hundredweight. They were divided into three lots, and fed in the open. In the first lot were put twenty of the larger steers, and the meal ration for these was increased as rapidly as possible, the object being to finish them in as short a period as practical, while the remaining eighteen head were divided into two lots of nine each, and are to be kept on feed till late in the spring. The main roughage fed all three lots was alfalfa hay, lots one and three being given three parts of alfalfa hay and one part of green feed (oat sheaves), while lot two had alfalfa only as a roughage. They were started on meal composed of barley and oats in equal parts, but were finished on ground screenings. Lot one, made up of the twenty head of larger steers, was sold on March 31 at \$12 per hundredweight, after being on feed 119 days. The net profit per head was \$20.35, after allowing the following high prices for the feed given: Alfalfa hay \$17, and green feed \$17 per ton, meal (oats and barley) \$2.35 per hundredweight, screenings (ground) \$2.10 per hundredweight. The cost to produce one pound of gain was 21 cents.

Lots two and three are not sold at the time of writing this report, but have made even better gains than lot one.

Sheep.—In October of 1916, a flock of 160 range ewes was purchased, and notwithstanding the fact that nearly 10 per cent of them were killed by dogs during the winter, a handsome profit was made. The following statement is of interest:—

Total cost, 160 ewes.. . . .	\$1,098 50	
Cost of one ram.. . . .	42 50	
Cost of 4,300 pounds grain.. . . .	75 25	
Cost of 4½ tons hay.. . . .	40 50	
Cost of shearing.. . . .	11 40	
Wool, 809 pounds at 64 cents.. . . .	.....	\$ 517 76
92 ewes (present value).. . . .	.....	1,380 00
1 ram (present value).. . . .	.....	40 00
102 lambs present value).. . . .	.....	918 00
Profit.. . . .	1,587 61	
	<hr/>	<hr/>
	\$2,855 76	\$2,855 76

A winter-feeding test with two carloads of lambs was carried out along lines similar to those followed during the past three or four winters. One car was sold at the end of March, and a profit was made of \$1.90 per head on the farm-reared lambs, and \$1.44 per head on range lambs. The prices charged for feed were the same as those in the feeding tests with steers given above. The second car of lambs are to be sheared in early April, and will be put on the market in May.

POULTRY.

The farm flock is now composed entirely of Barred Rocks. During the summer the White Leghorns were all disposed of. After four years of trial it has been fairly well demonstrated that this breed is not particularly adapted to the district, not being a success in the winter production of eggs. Some White Wyandotte eggs were obtained, and this breed will be used another year. Owing to several changes that had to be made with the help in charge of the poultry, the work accomplished during the season was not as satisfactory as usual. Barely 200 chicks were reared. The usual work in trapnesting of the pullets has been maintained.

9 GEORGE V, A. 1919

BEEES.

The results from the apiary during the summer of 1917 were only reasonably satisfactory owing to the fact that the three colonies were not strong in the spring and did not build up fast enough during the summer to produce the usual amount of honey. One hundred and four pounds of extracted honey were obtained, and most of this came from one colony.

FIELD HUSBANDRY.

Rotations.—In connection with the work with rotations there have been no striking results obtained during the past season. The following rotations are under test:—

Rotation "A": Wheat continuously.

Rotation "B": Two years' duration (wheat; summer-fallow).

Rotation "C": Three years' duration (summer-fallow; wheat; wheat or coarse grain).

Rotation "M": Six years' duration (summer-fallow; wheat; coarse grain, manured in fall; summer-fallow; peas and oats for hay; barley or oats).

Rotation "T": Ten years' duration (summer-fallow; wheat; oats or barley; seeded to alfalfa; alfalfa hay or seed; alfalfa hay or seed; summer-fallow; hoed crop; wheat, manured in fall).

The following rotations are irrigated:—

Rotation "U": Ten years' duration (seeding alfalfa; alfalfa for the five years; hoed crop; wheat; oats; barley).

Rotation "V": Alfalfa continuously.

Rotation "X": Fifteen years' duration (seeding alfalfa; alfalfa for nine years; barley; corn; wheat; oats; peas).

Crop Yields.—The yields of field crops on dry land varied to a large extent. Anything sown or planted on summer-fallow gave very fair returns. Grain crops sown on stubble land did not do well. The yields of all kinds of hay were light. On irrigated land, conditions were different. All kinds of crops irrigated at the proper time did well.

CEREALS.

On account of the dryness of the season, the yields of all cereals on the dry or non-irrigated part of the farm were very much lighter than was the case during the two seasons previous. On the irrigated land the results were quite satisfactory.

On the dry land, Bobs and Marquis stood at the head of fourteen varieties of wheat tested, yielding $31\frac{1}{2}$ bushels and 28 bushels to the acre, respectively. Of the seven varieties of oats tested, Danish Island, yielding 60 bushels and 30 pounds per acre, was the best, with Banner a close second. Eleven varieties of barley were under test, and of the standard sorts Swedish Chevalier gave the best yield, which was 40 bushels per acre. With field peas, Chancellor stood at the head of the list of seven, with a yield of $25\frac{1}{4}$ bushels per acre.

On the irrigated land there were six varieties of spring wheat tested and the two best yielding varieties were Huron, $58\frac{3}{4}$ bushels per acre, and Red Fife $57\frac{3}{4}$ bushels per acre. Of the five varieties of oats tested, Danish Island and Banner were the best with yields of 133 bushels and 129 bushels respectively. In the eleven barleys tested, Swedish Chevalier gave the best returns with a yield of 82 bushels per acre. With field peas, Golden Vine stood at the head of the list with a yield of 61 bushels per acre.

FORAGE CROPS.

Indian Corn.—Nineteen varieties of corn were grown on both the dry and irrigated parts of the farm. The yields on the former were low, White Cap Yellow Dent doing

SESSIONAL PAPER No. 16

the best with $6\frac{3}{4}$ tons per acre, weighed green. On the irrigated land the returns were much better. Comptons Early headed the list with a yield of 18 tons and 1,850 pounds per acre.

Roots.—The turnips on the irrigated land did particularly well. The highest yield was obtained from Imperial Greystone which yielded 44 bushels to the acre. On the dry land, out of the twenty-seven varieties tried, Imperial Greystone also yielded best, giving $26\frac{1}{2}$ tons per acre. Twelve varieties of mangels were under test. On the irrigated land, Perfection Mammoth was the best with a yield of 24 tons per acre, and it was also the best on the dry land, giving a yield of 14 tons per acre. Of the six varieties of carrots tested, Mammoth White Intermediate with a yield of 30 tons per acre headed the list on the irrigated land, while the Imperial Short White was the best in the dry land yielding 7 tons, 1,300 pounds per acre. Five varieties of sugar beets were tested and Royal Giant did the best on both dry and irrigated land.

Grasses and Clovers, etc.—Alfalfa, which is the main hay crop on the irrigated lands in the Lethbridge district, did not yield quite as well as usual. Winter-killing was again observed to a limited extent. On the dry land the yield of alfalfa as well as of grasses was light. The yield of alfalfa seed from the different fields varied considerably, but one acre field yielded 513 pounds of cleaned seed.

Pastures.—In the various mixtures of cultivated grasses and clovers used in the permanent pasture fields on irrigated land, it has been found that the addition of alfalfa to the mixture more than doubles the carrying capacity in every case.

HORTICULTURE.

The effects of the very unfavourable season of the year previous were still more or less apparent in the growth of trees and shrubs in 1917. This was true not only with apple trees, but with shade trees and ornamental shrubs. From an experimental standpoint, however, many valuable data have been gained as to the hardiness and adaptability of certain species, for any tree or shrub that could stand the rigours of the last two seasons certainly possesses value for the district.

Fruits.—Notwithstanding the trying conditions that prevailed during the last two seasons, it is encouraging to be able to report that small fruit, such as strawberries, raspberries and red and white currants, have fruited well. On the prairies where fruit of any kind is such a luxury, farmers should not hesitate about planting out such stuff in their gardens. Of the eighteen varieties of strawberries under test, the varieties giving the best yield for the season were Senator Dunlap and August Luther. Both yielded at the rate of over 6,000 boxes per acre. With the raspberries, the Loudon gave the best yield, though the Herbert also made a good showing. The necessity of bending the canes over in the fall and covering completely with moist soil was again demonstrated for, in the test made during the winter, those not covered were dead by spring. The average yield of the red currants was better than the white. Practically all varieties of black currants died back to the ground. None of the standard apple trees that are still living had fruit, although most of the cross bred trees bore a little but the crop was extremely light.

Vegetables.—It was a favourable season for most vegetables on account of being long and fairly warm, but dry-land gardens suffered from drought. The potato crop, even on the irrigated land, was only fair but all other vegetables did better than usual. Onions matured perfectly from seed and a larger proportion of tomatoes ripened than usual. Pumpkins, squash, etc., matured a greater proportion than the average.

Ornamental Gardening.—Many varieties of annuals, herbaceous perennials, and bulbs bloomed well and added much to the appearance of the grounds. Few ornamental shrubs, however, bloomed as they were too seriously affected by the severity of the winter.

EXCURSIONS AND VISITORS.

Three excursions or farmers' picnics were held in July. Arrangements were made with the Canadian Pacific Railway to run special trains to and from the Station on July 19 from Calgary via Aldersyde, on the 20th from Manyberries, and on the 21st from High River. The weather was fair on all three days, and in addition to those who came by train a large number of the farmers arrived in their own automobiles. The excursion from Manyberries over the Lethbridge-Weyburn line brought in many farmers and their families who had never previously visited the Station. During the year the number of people visiting the farm increased considerably, as 5,550 were counted.

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

THE SEASON.

Work on the land in the spring of 1917 was begun later than in any year since the establishment of the Station. The first seed in 1917 was sown on May 1, but seed-ing was not completed until the early days of June. A heavy rainfall during May and early June, accompanied by cold weather, seriously delayed vegetation, and in consequence live stock made heavy demands on fodder, and were turned out on de-layed pastures too early.

During the last week in June a period of warm weather began which continued throughout July and August, and forced rapid maturity of crops which in the first part of the season had promised to be abnormally late. Harvest operations began during the first week in August, became general by the middle of that month, and were further advanced on the first of September than in any season for ten years. Threshing was well under way in many districts early in September, the quality of the grain being good, and the yield fully up to the average.

A very heavy crop of both native and cultivated hay was harvested throughout this entire section of the province, and favourable weather made possible the curing of the hay in first-class condition.

On October 14 a heavy rain- and snow-storm set in which lasted for several days. The snow did not disappear entirely nor the frost again leave the ground. Probably 5 per cent of the potatoes and roots in this district were frozen in, and the early closing of the soil by frost prevented further fall ploughing. Temperatures during the winter have been low, with much wind, which drifted the snow to a more than usual degree.

METEOROLOGICAL RECORDS.

Month.	Maximum.	Date.	Minimum.	Date.	Precipi- tation	Sunshine.
	Deg. F.		Deg. F.		Inches.	Hours.
1916.						
April.....	58.8	11	4.9	2	1.24	150.8
May.....	75.8	11	12.9	4	3.262	208.3
June.....	83.3	16	27.9	3	1.49	255.8
July.....	85.8	18	29.9	30	1.13	348.7
August.....	85.8	16	30.9	8	1.885	254.4
September.....	82.2	21	23.9	29	2.043	175.3
October.....	72.8	5	8.4	22	1.363	123.6
November.....	69.6	19	11.4	26	.....	162.9
December.....	47.8	31	-42.1	12	1.3	53.8
1918.						
January.....	47.0	21	-44.0	30	0.53	57.0
February.....	47.8	22	-41.6	20	0.06	119.7
March.....	63.8	30	-35.6	5	0.3	191.6
					14.603	2,101.9

SESSIONAL PAPER No. 16

LIVE STOCK.

Horses.—The horses at Lacombe Station number twenty-seven head, and include registered representatives of the Clydesdale, Percheron, and Hackney breeds. Work teams, temporarily idle in winter, have again been wintered in the open; young horses which went out in thrifty condition have been well maintained on oat straw and one bundle of green-feed daily.

Dairy Cattle.—There are now twenty-five pure-bred Holstein cattle in the dairy herd. The manufacture of Cheddar cheese from the entire output of milk has been continued throughout the year. This product has been practically all marketed locally at 25 cents per pound wholesale. The average return per cow for the year has been \$196.44.

Beef Cattle.—This Station owns twenty-nine registered Aberdeen Angus cattle. The natural increase of the herd finds ready sale at profitable prices. In addition to the registered stock, forty-two grade cattle are on hand on March 31.

Sheep.—Twenty-six lambs were raised from twenty-seven common grade ewes in 1917. These lambs were sired by a registered Shropshire ram, and as a result of the infusion of this strain of blood showed increase in live weight and in length of staple as well. The sale of wool from the flock which was purchased in 1914 brought practically twice as much as the cost price of the foundation flock. Over four hundred range ewes were purchased in 1917 and divided into six flocks, with the object of testing the relative merits of different pure breeds of sheep for grading up the average range flock. Shropshire, Oxford, Hampshire, Leicester, Cheviot, and Corriedale sires are in use. The Corriedale ram purchased was first prize ram at Rangiora, New Zealand, this season, while the other sires are representative individuals of the respective breeds.

Swine.—Experiments have been conducted to determine both the stock-carrying capacity of various pastures for hogs, and the pounds of grain required for a pound of pork gain with different pastures. The results indicate the best commercial pastures to be alfalfa and rape, the former for use early in the season, and the latter for late summer and fall. Of those tested, the best single pasture was rape. It required 4.34 pounds of grain to make 1 pound of pork on the self-feeder with rape pasture. It required 6.16 pounds of grain to make a pound of pork on the self-feeder, without pasture of any kind. An acre of rape pasture effected an economy of 2,453 pounds of grain, which would have, at present prices, a cash value of about seventy-five dollars. Hogs fed through the self-feeder not only produced a pound of pork for less grain, but weighed one hundred and ninety-nine pounds at the same time that those fed a 3-per cent ration by hand weighed one hundred and eighteen pounds. The self-feeder, therefore, effected an economy of time, labour, and feed. An experiment to determine the economy of various breeds for the production of pork was continued during the past year, but a further season's work must be carried on before the final results are available. Six hundred and seventy-five hogs were used in 1917 in securing information along all these lines. This does not include the breeding stock maintained at this Station, which numbered eighty head at the close of the fiscal year.

POULTRY.

The stock of poultry at Lacombe consists of sixty-one hens, one hundred and seventy-nine pullets, twenty-seven cocks, and three capons, of the Barred Rock, White Wyandotte and Single Combed Rhode Island Red breeds; also eight geese. Trap-nesting of different pens of pullets has been carried on during the winter, and the records secured indicate the value of this system of selecting the best laying foundation stock.

9 GEORGE V, A. 1919

BEES.

During the winter of 1916-17 two colonies of bees died, due to the candying of the stores. The remaining four colonies came through in excellent condition, and produced a surplus of two hundred pounds of extracted honey. That one colony produced one hundred and thirteen pounds of honey is evidence of the possibilities of bee-keeping in this locality.

FIELD HUSBANDRY.

Rotations.—The main rotation of the farm, including some 215·6 acres, is as follows:—

Hay, manured in winter, 12 tons to the acre.

Pasture, ploughed in July or August 6 inches deep and fall worked.

Wheat (or oats).

Oats.

Barley, and seed down with timothy and alsike clover.

The possibilities of this rotation in its relation to the cleaning of the land are more apparent each year. The percentage of weed seeds in the grain crop is decidedly less than at the beginning, and this result has been secured without the loss of a single year's crop. An encouraging feature in connection with the various rotations is the success with which clover is being grown.

Cultural Experiments.—A single ploughing for summer-fallow early in the season gave better results than double-ploughing early and backsetting later. Ploughing 6 to 8 inches deep gave the maximum yields. Summer-fallow ploughed in May or June gave decidedly better yields than when the land was left untouched until July. The practice of seeding grass and clover with a nurse crop is again to be recommended for this district, especially when the land has been summer-fallowed or has grown a hoed crop the previous year.

The application of manure to land for the production of roots and grain has again proved valuable. An increase of 1 ton per acre of roots, 5 bushels per acre of wheat, 6 bushels and 30 pounds of barley per acre and 10 bushels and 8 pounds per acre of oats resulted from the application of twelve tons of barnyard manure per acre.

CEREALS.

Eighteen varieties of spring wheat were sown in duplicate plots at the rate of 3 bushels per acre. The highest yield among the named varieties in 1917 was secured from the "Bishop" variety, which yielded at the rate of 56 bushels 40 pounds per acre. Thirteen varieties of oats were grown, the highest yield being 138 bushels per acre secured from the Danish Island variety. Of the eighteen varieties of barley grown, the "Barks" gave the largest yield, viz., 84 bushels per acre. A number of the new selections of grains stand well up in the list, and give promise of being of distinct value for this section of the West. The new wheat, Ruby (Ottawa 623) gave a yield of 42 bushels per acre under field conditions.

FORAGE PLANTS.

Indian Corn.—On account of the cold temperatures during the early months of the growing season, the varieties of corn under test failed to make sufficient growth to warrant the taking of records.

Roots.—Turnips were seeded on Rotations "K" and "O", and gave a yield of 13 tons per acre. Assuming the feeding value of \$3 per ton as being the limit in value of roots of this class for cattle, it would appear unwise to encourage extension of the areas devoted to this particular crop while labour is as high-priced and as difficult to secure as at the present time.

SESSIONAL PAPER No. 16

Grasses and Clovers.—For pasture purposes the seeding of alfalfa in drills is distinctly superior to the broadcast method, while the yields of hay secured have been but slightly less under this system. A consideration of importance is the first cost of getting the crop established, since the drill system effects a saving of at least eight pounds of seed per acre. Fifty-six plots of one-fortieth of an acre were sown to various mixtures of grasses and clovers with the object of making comparisons between the different varieties singly and as mixtures, both for hay and pasture purposes.

HORTICULTURE.

Fruits.—Crab-apples have been ripened at this Station during the past year, which completes a cycle of five years during which fruit has been successfully matured. Such standard apple trees as Charlemoff, Hibernial, Antonovka, and Blushed Calville give promise of fruiting when they have attained sufficient size. Large yields of fruit of good quality were secured from the new currant plantation; the largest crop of gooseberries yet ripened was harvested, while the yield of raspberries was also the heaviest on record. The yield and quality of the strawberries were good, the Senator Dunlap giving the most satisfactory return.

Vegetables.—The usual vegetables were successfully grown, both variety and cultural tests being carried on on a somewhat large scale. The cost of growing an acre of potatoes was carefully kept, as well as extensive tests carried on as to distances apart in planting, depths and frequency of cultivation.

Trees and Shrubs.—A splendid showing was made by the following shrubs: *Cotoneaster nigra*, *Syringa villosa*, *Lonicera grandiflora rosea*, *Lonicera Tartarica*, *Spirea Van Houttei*, *Spirea sorbifolia* and *Caragana arborescens*. The hedges making the best showing are laurel willow, caragana, and white spruce.

BUILDINGS.

A new silo, sixteen by thirty-six, was erected, which addition to the silo space now provides a total capacity of about two hundred and fifty tons.

EXHIBITIONS.

An educational exhibit was shown by this Station at sixteen points throughout the province last year, and was visited by approximately 25,500 people. The mailing list was signed by 994 persons, and 13,700 bulletins were distributed.

MEETINGS.

The Superintendent addressed meetings during the year at Edmonton, Camrose, Rimbey, Olds, Calgary, Edmonton (University), Ottawa, Regina, Saskatoon (Dairy Convention), Edmonton, Sylvan Lake, Castor, Bowden, Vermilion, Vulcan, and Lakeside. He acted as judge of swine at Calgary Exhibition, and of sheep and swine at Red Deer, and at the Provincial Seed Fair for Saskatchewan, at Saskatoon. Mr. B. C. Milne, Assistant to the Superintendent, addressed meetings at Sulphur Springs, Eye Hill, and Provost.

EXPERIMENTAL STATION, SUMMERLAND, B.C.
REPORT OF THE SUPERINTENDENT, R. H. HELMER.

THE SEASON.

The precipitation during the growing season was unusually low, and although the winter of 1916-17 was very severe, very little snow fell in the hills. Only 5.97 inches of rain fell from early spring to late fall. May and June were the wettest months. Only one day's rain helped to any extent, on May 24, when 0.80 inch fell in the twenty-four hours. This rain did much to save the Okanagan from a crop failure, as it filled the reservoirs which the melting snow had failed to do. The light snowfall reduced the amount of water very materially, and crops generally suffered from this shortage. July was the hottest month, with an average of 85.12° maximum, 56.32° minimum, hottest day 98.00° in the shade, and 370 hours sunshine. The winter of 1917-18 has been very mild, the lowest temperature being 2 degrees below zero on January 31. There is an abundance of snow in the hills, which means full ditches this year.

METEOROLOGICAL RECORDS.

Month.	Temperatures.			Rainfall.	Snowfall.	Sunshine.
	Maximum.	Minimum.	Mean.			
	Deg. F.	Deg. F.	Deg. F.			
1917.				In.	In.	Hours.
April.....	62.00	21.00	44.68	0.98	.....	128.9
May.....	76.00	33.00	54.85	1.84	.....	196.2
June.....	88.00	42.00	59.63	1.25	.....	205.7
July..	98.00	46.00	70.72	0.33	.....	370.1
August.	96.00	50.00	69.75	0.18	.....	326.9
September.....	82.00	41.00	59.73	0.89	.....	187.1
October.....	81.00	27.00	50.02	0.08	.....	170.8
November.....	52.00	26.00	41.26	0.10	.....	41.8
December.....	53.00	2.00	28.95	.....	32.25	20.6
1918.						
January..	44.00	-2.00	29.47	0.02	10.8	53.2
February.....	48.00	4.00	27.87	0.01	4.5	85.3
March.....	64.00	11.00	38.74	0.16	1.4	118.9
Totals.....				5.74	48.95	1,905.5

LIVE STOCK.

Horses.—There are seven horses on this Station, three teams and one driver. All are in good condition, and have worked practically every day, winter and summer.

Cattle.—Fifty-nine head of cattle were purchased for feeding purposes in the fall. The older steers have made good beef, and the younger ones have grown well and made good gains.

Sheep.—In November ten ewes and one ram, pure-bred Cheviots, were purchased, and also twelve grade Oxford-Shropshire ewes. A ewe lamb born January 24 has grown very well indeed; other lambs were born during March.

Swine.—Three Berkshire sows and one boar were bought this spring. Two of the sows have farrowed, and one had just weaned a litter before purchase.

POULTRY.

Fifty White Wyandotte pullets were purchased in December, and have laid well all the winter. Six White Wyandotte cockerels were received from the Sidney Experimental Station, and five turkey hens and one tom were sent from the Invermere Experimental Station.

SESSIONAL PAPER No. 16

BEES.

Of the three colonies of bees that were wintered in an outdoor wintering case, only one came out alive in the spring of 1917. Two more colonies were purchased locally, and these did fairly well. Two swarms were cast, and five colonies, four strong and one rather weak, were put away for the winter. A casual glance was taken at them during March, and apparently four are in good condition.

FIELD HUSBANDRY.

The first cutting of hay crops such as alfalfa, clover, and timothy, yielded heavy crops of excellent quality. The second crop of clover was light owing to water shortage, second crop of alfalfa was fair, and the third crop was practically nothing. The alfalfa ground was badly burnt up, but seems to be sprouting well this spring. Oats and barley were very disappointing crops. The prospects for both were excellent, but the hot spell in July, with the shortage of water, reduced yields very much. In some cases the crop was not worth threshing. In this respect it was found that two-row barley filled the best.

CEREALS.

Rotation.—A five-year rotation is used in the variety tests for cereals and peas and flax. Wheat, oats, and barley are in quadruplicate plots, and peas and flax in sextuplicate. It is hoped to increase the varieties under test this year. The corn variety plots will appear in the hoed crop year of the cereal work.

Red Fife wheat gave highest yield with 50 bushels per acre, Marquis was second with 49 bushels, O.A.C. barley yielded 63.75 bushels per acre, Daubeney oats yielded 88 bushels. This year's cereal plots will come on land that was well manured during the winter of 1916-17 and planted to beans last year.

On the dry farm very fair yields of grain were obtained, considering the dry season.

FORAGE PLANTS.

The growing of forage plants is one of the most important phases of work on this Station. The duplicate plot system is being used on a four-year rotation.

Indian Corn.—Thirteen varieties were tested, and Reid's Yellow Dent gave the highest yield. All corn was fully ripe when harvested.

Roots.—Fifteen varieties of mangels were grown, and the suitability of the Intermediate type for bench land was well demonstrated. Ten varieties of carrots were grown, and here also the Intermediates showed superiority over the other types. Twenty-three varieties of swede turnips yielded very low, as also did six varieties of fall turnips. Lack of water enfeebled the plants and allowed aphids to check the growth still further. Plots of Swiss chard, rape, thousand-headed kale, kohlrabi, and sugar beets gave good returns. Alfalfa and timothy and clover, which are the principal hay crops, gave good yields of first-class hay, the first cuttings; second crops suffered from water shortage, and the third crop of alfalfa was very poor. Three and a half acres of Mammoth White Intermediate, and half an acre of White Belgian carrot stecklings were grown. The seed was sown on July 14, and produced excellent stecklings by October 30. Bruce's Mammoth White Feeding sugar beet, sown on August 4, produced good stecklings by October 30, when all were dug and pitted. These came through the winter in good condition. A few rows of carrots were ridged with a small plough and covered with potato tops and pine needles and have come through the winter well. It is doubtful, however, whether this could be done every winter.

HORTICULTURE.

Fruits.—The apple trees have made good growth, and are healthy and vigorous. The orchard under clean cultivation has, on the whole, made the largest growth; the orchard under soiling crops has much improved, and the one under clover also. In the orchard in which truck crops are being grown, a good crop of potatoes was harvested. The orchard under a farm rotation, which is on the poorest soil, has improved. The alfalfa orchard has made least progress. The pears have not grown as well as they should have done; peaches, plums, apricots and cherries have done well. Small fruits such as black, white, and red currants gave fair yields.

Vegetables.—Hot weather vegetables, such as egg plants, peppers, tomatoes, and cucumbers, were of good quality this year. Cabbages and cauliflowers suffered from the heat and dry weather. Good yields of peas were obtained.

Ornamental Gardening.—The grounds were very much improved by the lawns that were started this year. The bulbs were very fine, and the flower garden attracted many visitors to the farm.

FERTILIZER EXPERIMENTS.

A three-year experiment with commercial fertilizer alone and in combination with barnyard manure was started this year, with potatoes as the first crop, followed by oats seeded with clover, and then clover hay. The plots gave very varied results. Those to which barnyard manure alone had been applied at the rate of 20, 15, and 10 tons per acre showed good colour early in the season and heavy tops, but owing to water shortage the crop was disappointing.

BUILDINGS.

An implement shed, 16 feet by 60 feet, was erected near the cattle pens and a sheep shed, 16 feet by 50 feet, was built during the winter. An office, 25 feet by 40 feet, was also put up. This is a two-storied building with full basement. The top story is one big room. The first floor consists of one main office, one small office, and one work-room. It is steel-lathed and plastered on the outside, and is a big improvement on the old office. Two permanent poultry houses, 16 feet by 32 feet, and a poultry administration building have been erected. A cement distributing box and settling tank was put in at the outlet of the steel irrigation water pipe. This will save a lot of trouble from flumes blocking up, which gave considerable trouble last year; among the varied collection of things coming through were little chickens and pigs, hens, snakes, and fish. All these will now be taken care of before they can reach the flume. A temporary cook-house and a bunk-house are in course of construction.

EXHIBITIONS AND MEETINGS ATTENDED.

This Station had an exhibit at the following shows: Kelowna, Armstrong, Kamloops, and Summerland. The new background for the exhibit was favourably commented on by all. The Superintendent visited Sorento in May at the request of the fruit growers of that section in connection with winter injury to trees, and in September visited this section again on the way to Kamloops exhibition. He also attended Women's and Farmer's Institute meetings at Naramata, Summerland, and Armstrong. the Seed Fair at Armstrong, the convention of the British Columbia Stockbreeders' Association, a meeting of the British Columbia Seedgrowers' Association, and the annual meeting of the United Farmers of British Columbia at Victoria.

VISITORS.

It is pleasing to note that visitors are becoming more numerous. The Naramata Farmers' Institute spent a day at the Station and also the Kelowna Farmers' Institute; the Summerland Women's Institute gave a picnic on the Station to the Women's Institutes from Peachland, Naramata, and Penticton. The school children visited the Station in connection with potato competitions.

EXPERIMENTAL STATION, INVERMERE, B.C.

REPORT OF THE SUPERINTENDENT, G. E. PARHAM.

THE SEASON.

The spring of 1917 was very backward, and ploughing was not possible before April 15. On twenty-four days during that month night frosts of varying intensity were recorded, and the mean temperature was only 37.93° . It was observed that the ice did not finally leave lake Windermere until May 3.

Spring seeding was commenced the first week in May, and the genial weather during that month, with a record of 227 hours of sunshine and 2.87 inches of rain, retrieved the situation to some extent, and plant growth was materially advanced. A dry season followed, total precipitation for the three months ending August 31 amounting to 3.45 inches, with a daily average of 9.7 hours of sunshine: the sunshine readings for June totalled no less than 365 hours, showing a daily average of 12.2 hours. In consequence of the drought, the dry-farming plots at the Station were almost a complete failure, but some excellent crops were harvested from the irrigated sections; hay and grain crops matured rapidly, and were harvested under ideal conditions.

The winter season was remarkable for the unusually heavy snowfall, amounting to 39.65 inches, being 3 inches in excess of the combined totals of the two preceding years. Some Chinook winds, in previous years, have swept bare the exposed portions of the Station, causing winter-killing of the clover and other plants, but this year, the land has maintained a good covering of snow throughout the entire season.

LIVE STOCK.

Dairy Cattle.—The herd consists of three Shorthorn cows, purchased in 1916, together with their progeny—two heifers and a steer—and a registered Shorthorn bull procured from the Experimental Farm at Indian Head, which will be used for the benefit of local breeders as well as for service at the Station.

Hogs.—While hog raising has not been commenced at the Station, the need in the district of a reliable boar was expressed at the general meeting of the Agricultural Association, and in response to their appeal to the Director, a Berkshire boar has been sent in from the Lacombe Station, which is being made use of by farmers in the neighbourhood.

POULTRY.

The stock consists of Barred Rocks, White Leghorns, and Light Sussex Egg-laying records of one pen in each breed were kept by means of trap-nests, the highest individual records in the three breeds being 208, 193, and 151, respectively. The pen showing the best record was one of 25 Barred Rocks, the total number of eggs laid being 3,862—an average of 154.5 per bird. Feeding statistics show that the amount of food consumed during the twelve months averaged 96 pounds, at a cost of \$2.69 per bird: the average cost (for food) of a dozen eggs, during the year, was 20.8 cents. A considerable saving of labour has resulted from the adoption of hopper-feeding, and in the use of snow in place of water during the winter months. Further experiments were conducted in crate fattening, and some excellent results were obtained. All cockerels not held for breeding purposes were sold locally, the demand being keen at 25 cents per pound, live weight.

Turkeys.—A flock of American Bronze turkeys was raised, some being hatched out under fowls, and others by artificial incubation. The young birds are accommodated in an open house, with wire netting on three sides, while the stock birds are kept,

throughout the year, in a wire enclosure, with the native firs as their only shelter. Except for the ravages of owls and coyotes, which accounted for several losses, there was no mortality among the latter, and they have come through the winter in fine condition. Feeding experiments were conducted, thirty-eight male birds being fattened for the Christmas market, and they found a ready sale at 30 cents to 35 cents (dressed) per pound, according to weight.

APIARY.

The season's work commenced with twelve colonies, of which six had been wintered in a cellar, two in the open, protected by double packing cases lined with moss, and four in a trench, dug into a dry, sandy knoll, and covered with 6 inches of straw and 9 inches of earth.

Though all the colonies came through the winter in good shape, those buried in the trench wintered best, and when taken out in the spring were found to be practically as strong as when put in.

The honey yield during the 1917 season was, in common with that of the whole province, below the average, amounting to 975 pounds.

The average per colony was 81½ pounds, the highest from any one colony being 120 pounds. , One hive was placed upon scales, and a daily record kept of its gain or loss in weight.

FIELD HUSBANDRY.

Rotations.—Experiments were continued in the 3-, 4-, 5-, and 6-year rotations, and, for purposes of comparison with these methods, one plot on the irrigated section has been seeded to oats continuously, without manure or fertilizers, and another plot with oats and summer-fallow alternately. With the 4-year rotation a record is kept of the amount of water used for irrigation, together with the amount per acre on each half-acre plot. The following table gives the figures for the four years:—

Plot I.		Plot II.		Plot III.		Plot IV.	
Acre-inches.		Acre-inches		Acre-inches'		Acre-inches	
Crop.	per acre.	Crop.	per acre.	Crop.	per acre.	Crop.	per acre.
1914...Roots...	12.78	Oats.....	5.89	Peas.....	11.40	Oats.....	9.27
1915...Wheat..	5.04	Roots.....	2.03	Oats.....	6.73	Peas.....	5.84
1916...Peas....	3.52	Wheat.....	....	Roots.....	1.52	Oats.....	....
1917...Oats....	4.14	Peas.....	9.69	Wheat.....	7.55	Roots.....	5.75

Much of the clover in the rotation plots was winter-killed and the plots were either re-seeded in the spring, or sown to peas for hay.

FORAGE CROPS.

Seed Production.—Experiments in seed production were inaugurated in the season under review. The plants selected were alfalfa, meadow fescue, sainfoin, Western rye, red clover, orchard grass and alsike. Plots measuring one-thirtieth of an acre each were sown broadcast, and a further series of plots was sown in drills. Of these, the only plants that produced any yield in this, the first year of the test, were meadow fescue and Western rye. The fescue when threshed yielded at the rate of 121 pounds per acre from the broadcast plot, and at the rate of 150 pounds per acre from the plot sown in drills. The western rye yielded at the rate of 412½ pounds and 337½ pounds respectively. Experiments were also inaugurated in the production of hay from mixtures of clover and various grasses, and from mixtures of alfalfa and various grasses; a good stand was obtained in all the plots.

Soiling Crops and Annual Hay Crops.—Test plots were started to determine the most suitable crops for soiling purposes and for annual hay production. The plots selected had been in clover sod for three years, and were treated with a heavy dressing of barnyard manure prior to seeding on June 22. The following yields per acre were produced:—

SESSIONAL PAPER No. 16

Soiling Crops: Broad-leaved Essex rape, 42 tons; Dwarf Essex rape, 40½ tons; Thousand-headed kale, 32¾ tons; Swiss chard, 341½ tons.

Annual Hay: (All cut green) Sudan grass, 6¾ tons Hog millet, 13½ tons; Siberian millet, 12½ tons; Japanese millet, 12½ tons; peas and oats, 12½ tons; vetches, 28¼ tons. The Sudan grass and Japanese millet were injured by frost.

Roots.—Variety tests were carried out with mangels and turnips. The former were entirely destroyed by the cutworm, while, of the latter, the heaviest yielders among the twenty-eight varieties sown proved to be White Globe and Mammoth Greystone.

Corn.—Nine varieties of field corn were planted on the 23rd May, but though the plots yielded well as fodder, no cobs matured; the best yields were from Gehu, Reid's Yellow Dent, and King Philip.

CEREALS.

Variety tests were made with wheat, barley and oats, with the following results:—

	No. of days maturing.	Yield of grain per acre.	Weight of measured bushel, after cleaning.
		Bush. Lb.	Lb.
Wheat—			
Huron.....	135	27 40	63
Marquis.....	136	24 20	62
Pioneer.....	136	23 20	59
Barley—			
Manchurian.....	92	18 00	42
Success.....	86	15 40	47
Chevalier.....	119	23 36	51
Gold.....	119	45 20	56
Oats—			
Banner.....	125	30 40	44
Daubeney.....	121	24 28	42
Victory.....	125	36 32	43

The above plots measured one-twentieth acre, and were sown during the first week in May, with the exception of the Manchurian and Success barleys, which, owing to poor germination, were cultivated out and resown on June 12.

Field Peas.—Five one-twentieth-acre plots of peas were sown on the 4th and 5th of May, as a variety test, and the following yields were obtained:—

	No. of days maturing.	Yield of grain per acre.	Weight of measured bushel, after cleaning.
		Bush. Lb.	Lb.
Arthur.....	139	44 40	63
Chancellor.....	133	45 66	66
Golden Vine.....	133	48 00	65
Prussian Blue.....	139	55 40	67
Solo.....	133	47 40	63

FIBRE PRODUCTION.

A commencement was made in growing hemp and flax for fibre production: four one-tenth-acre plots were sown, and the produce of one plot was forwarded to the Central Farm for further treatment.

HORTICULTURE.

Vegetables.—Tests of varieties and of cultural methods were carried out as in previous years, and some good crops of potatoes and garden vegetables grown, though, through the depredations of the onion maggot, the onion crop was again a failure. Satisfactory results were obtained in forcing seakale and rhubarb in the cellar, for winter use, and a number of inquiries have been received, and parties furnished with information as to the methods used in this work.

Fruits.—After experiments extending over three years with a number of well-known varieties of apple, the fact seems established beyond doubt, that only the crabs and some of the hardiest of the Russian varieties show any promise of being able to stand the severe winter conditions at this Station; on the other hand, it has been observed that orchards in the district, situated in sheltered localities, and on northerly slopes, have suffered much less from winter-killing, and in some cases promise well. Some good crops of bush fruits were gathered, and some interesting results obtained in the testing of different varieties, and of various methods of pruning.

NEW LAND.

Thirty acres of the adjacent bench land, recently acquired for this Station, were partly cleared, and approximately 10 acres were broken and seeded; the land produced a useful crop of oats, a part of which was fed green to the cattle, while the balance was cut for hay.

EXHIBITIONS.

The following fall fairs were attended: Invermere, Cranbrook, Nelson, Grand Forks, Needles, and Nakusp. Considerable interest was evinced, at all points visited, in the Farm exhibit, the fine appearance of the new background and fixtures being invariably commented upon.

The exhibit has been the means of bringing a large number of farmers into personal touch with the Station, as well as with the work of the Experimental Farms generally.

A quantity of literature was distributed at the fairs, while requests for special information on a variety of subjects have been dealt with from this Station.

EXTREMES OF TEMPERATURE.

Month.	1914.				1915.				1916.				1917.			
	Max.		Min.		Max.		Min.		Max.		Min.		Max.		Min.	
	Date	°	Date	°	Date	°	Date	°	Date	°	Date	°	Date	°	Date	°
April.....	30	71	1	22	16	75	21	24	26	76	23	21	14	54	1	11
May.....	16	87	6	28	7	78	29	30	4	71	11	26	12	77	1	22
June.....	18	85	6	34	24	82	8	35	18	88	7	34	16	86	13	35
July.....	31	95	16	42	20	83	5	40	31	88	23	39	17	94	31	36
August.....	1	95	31	33	6	89	5	44	27	84	4	37	16	88	31	37
September....	2	80	30	33	5	80	20	27	1	77	28	24	21	80	31	27
October.....	16	66	22	24	23	65	7	23	16	67	4	20	3	73	28	9
November....	25	51	15	3	1	49	13	- 4	1	47	12	-12	4	50	1	16
December....	2	35	15	-16	4	40	30	-16	2	39	27	-31	18	44	25	15
			19 15.				19 16.				19 17.				19 18.	
January.....	11	36	21	-15	23	40	12	-34	9	40	31	-25	3	-40	31	-32
February.....	17	44	14	- 1	15	48	3	-25	12	44	1	-26	7	46	1	-27
March.....	21	63	8	12	11	58	5	1	5	42	1	- 8	29	62	6	- 5

SESSIONAL PAPER No. 16

MEAN TEMPERATURES DURING SAME PERIOD.

Month.	1914.			1915.		
	Mean Max.	Mean Min.	True Mean.	Mean Max.	Mean Min.	True Mean.
	°	°	°	°	°	°
April.....	55.46	32.23	43.84	61.83	32.20	47.01
May.....	65.83	38.13	51.98	63.31	40.83	52.07
June.....	68.33	45.50	56.91	68.43	44.00	56.21
July.....	81.29	47.67	64.48	71.83	48.77	60.30
August.....	78.32	43.12	60.72	81.90	48.25	65.07
September.....	61.86	37.70	49.78	62.63	36.40	49.51
October.....	49.87	33.67	41.77	53.83	34.00	43.91
November.....	37.50	23.86	30.68	32.00	16.66	24.33
December.....	19.74	3.67	11.70	29.58	12.67	21.12
		1915.			1916.	
January.....	22.45	3.80	13.12	4.83	-14.41	- 4.79
February.....	36.00	14.56	25.73	28.40	6.60	17.50
March.....	42.67	23.58	33.12	42.90	22.90	32.90
		1916.			1917.	
April.....	55.10	29.50	42.30	49.06	26.80	37.93
May.....	57.90	35.20	46.55	63.50	37.00	50.25
June.....	68.60	43.30	55.95	66.60	41.00	53.80
July.....	81.29	47.67	64.48	81.50	47.40	64.40
August.....	75.00	43.90	59.45	76.40	44.30	60.30
September.....	63.76	35.56	49.66	65.03	38.23	51.63
October.....	50.50	27.90	39.20	53.20	27.80	40.50
November.....	31.70	12.40	22.05	36.70	27.30	32.05
December.....	14.00	-3.90	5.05	23.50	7.50	15.50
		1917.			1918.	
January.....	21.80	2.90	12.35	22.80	6.70	14.70
February.....	25.60	3.00	14.30	23.90	3.14	13.52
March.....	35.70	9.10	22.40	42.00	19.00	30.50

SUNSHINE RECORDS.—MONTHLY TOTALS AND RATIO TO POSSIBLE HOURS.

Month.	1914.			1915.		1916.		1917.	
	Possible.	Total hours.	Ratio.	Total hours.	Ratio.	Total hours.	Ratio.	Total hours.	Ratio.
April.....	414.2	165.1	0.40	208.7	0.47	182.5	0.44	168.9	0.40
May.....	480.8	237.1	0.47	168.0	0.32	179.1	0.37	227.0	0.47
June.....	494.1	198.4	0.40	197.7	0.40	202.0	0.40	230.2	0.46
July.....	497.9	314.5	0.63	211.4	0.42	271.1	0.54	365.1	0.73
August.....	450.7	267.9	0.59	269.9	0.65	269.0	0.60	300.4	0.66
September.....	379.0	148.3	0.39	151.8	0.40	192.2	0.51	142.9	0.38
October.....	329.6	86.7	0.26	124.7	0.37	159.2	0.48	147.2	0.44
November.....	266.1	56.4	0.21	59.0	0.22	84.6	0.31	23.7	0.09
December.....	242.3	86.8	0.36	43.4	0.17	84.4	0.34	38.2	0.15
		1915.		19 16.		19 17.		19 18.	
January.....	259.2	46.0	0.18	99.0	0.38	80.1	0.30	44.1	0.17
February.....	276.6	70.9	0.25	97.8	0.31	99.8	0.36	80.9	0.29
March.....	366.6	175.8	0.47	131.7	0.35	143.7	0.40	141.7	0.39
Totals.....	4,457.1	1,853.9	0.42	1,763.1	0.40	1,947.7	0.44	1,910.3	0.43

RAIN AND SNOWFALL RECORDS.

Month.	1914.			1915.			1916.			1917.		
	Rain.	Snow.	Total	Rain.	Snow.	Total.	Rain.	Snow.	Total.	Rain.	Snow.	Total.
April.....	1.25	.....	1.25	1.14	.....	1.14	0.62	.....	0.62	0.18	0.5	0.23
May.....	1.46	.....	1.46	1.01	.....	1.01	2.89	.....	2.89	2.85	.....	2.85
June.....	1.59	.....	1.59	3.92	.....	3.92	2.01	.....	2.01	1.96	.....	1.96
July.....	1.57	.....	1.57	3.79	.....	3.79	2.32	.....	2.32	0.29	.....	0.29
August.....	0.75	.....	0.75	0.67	.....	0.67	2.01	.....	2.01	1.20	.....	1.20
September.....	2.16	.....	2.16	0.72	.....	0.72	1.15	.....	1.15	0.75	.....	0.75
October.....	0.77	.....	0.77	0.90	.....	0.90	0.54	.....	0.54	0.19	2.2	0.41
November.....	0.39	4.00	0.79	0.10	8.0	0.90	0.08	2.5	0.33	0.38	.....	0.38
December.....	.....	4.25	0.42	0.28	3.0	0.58	.....	3.0	0.30	0.17	24.2	2.59
		1915.			1916.			1917.			1918.	
January.....	0.00	5.12	0.51	0.01	4.3	0.44	.....	1.5	0.15	1.96	.....	1.96
February.....	.....	3.00	0.30	0.21	10.1	1.22	.....	3.6	0.36	0.06	11.62	1.22
March.....	0.03	.....	0.03	0.33	1.2	0.45	.....	1.8	0.18	0.24	1.1	0.35
Totals.....	9.97	16.37	11.60	13.08	26.6	15.74	11.62	12.4	12.86	10.23	39.6	14.19

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE OFFICER-IN-CHARGE, W. H. HICKS, B.S.A.

THE SEASON.

The spring of 1917, like to its predecessor, opened very late. The heavy precipitation of 9.84 inches in April practically prohibited seeding until the latter part of the month. The exceptionally dry, bright May was just what was needed to get the crops sown in good condition, and made up in many respects for the wet month preceding. June was fairly wet, with the rain well distributed; July and August were dry and hot; September was cooler with more rain, while October was the driest since 1911; 8.7 inches of rain fell in November and December was the wettest month of the year. Although the growing season was dry, the winter months were so exceptionally wet that the total precipitation amounted to 79.27 inches for the year, which is the greatest recorded since 1913.

The late spring and dry summer were not conducive to the best root and pasture crops. The grain and hay yields were fair, the latter being of excellent quality. The corn crop was one of the best ever grown on the Farm.

SESSIONAL PAPER No. 16

METEOROLOGICAL RECORDS.

Month.	Maximum Temperature.		Minimum Temperature.		Mean.	Precipitation.			Sun-shine. Hours.
	Date.	Degree.	Date.	Degree.		Rain.	Snow.	Total.	
April.....	28	67	2	30	44.51	9.84	.....	9.84	75.3
May.....	8	78	18	35	53.52	2.22	.....	2.22	138.7
June.....	27	82	11	42	56.23	4.3	.....	4.3	127.3
July.....	14	87	23	38	62.75	0.59	.....	0.59	267.5
August.....	16	89	25	43	64.88	1.1	.....	1.1	278.8
September.....	4	83	25	34	58.49	3.44	.....	3.44	128.7
October.....	7	74	27	31	48.59	6.84	.....	6.84	100.8
November.....	13	61	26	30	45.06	8.71	.....	8.71	53.8
December.....	18	59	27	15	35.73	11.59	32.0	14.79	15.7
1918.									
January.....	23	51	30	15	37.25	9.16	6.0	9.76	23.6
February.....	8	51	18	19	36.49	5.37	16.5	7.02	75.4
March.....	29	60	5	20	40.37	9.16	15.0	10.66	79.5
						72.32	69.5	79.27	1,365.1

LIVE STOCK.

Horses.—Eleven horses are kept on the Agassiz Farm for working purposes. The average feed cost per hour's work done by the heavy draught horses from April 1 to November 1 amounted to 5.52 cents and for the light draught horses 5.55 cents. Three of the latter were wintered in an open shed on a daily feed ration costing 22 cents. They came through the winter in good condition for work in the spring. A start was made in horse breeding by the purchase, in October, of the pure-bred Clydesdale mare Melita Imp. (28941). This is a massive mare with fair quality and is in foal to Bowhill Baron (9492).

Cattle.—The herd of dairy cattle now comprises eighty head, thirty of which are pure-bred and fifty grade Holsteins. Of the twenty-nine cows which have finished a lactation period during the year, 44.9 per cent have given heifer calves. The average milk production per cow for the entire herd is 8,372.4, the duration of the lactation averaging 337 days. The cow Aurora Mechthilde (9701), tested under Record of Performance rules, produced 18,195 pounds of 3.48 milk in 350 days. The general health of the herd has been excellent. The tuberculin test was again applied and no disease discovered. Another year's feeding demonstrates the suitability of pea and oats or clover silage as a substitute for corn. The cost of raising heifers has increased, due to the high values placed upon all concentrates.

The Empire mechanical milker installed in 1916 continues to give good satisfaction.

During the year, over five thousand cream cheeses have been manufactured, and found a ready market in the city of Vancouver. A limited number of Camembert, Pont l'Eveque, and Stilton cheeses have also been disposed of. Milk testing work for the year has consisted of the regular weekly test of each cow in the herd, Record of Merit work, and samples sent in by farmers in the province.

Sheep.—The flock at the Agassiz Farm now numbers 75 sheep and 53 spring lambs, 55.5 per cent of them being pure-bred Horned Dorsets. The average feed cost per sheep for wintering the flock amounted to \$3.19. The 1918 lamb crop at date of writing is very satisfactory but a few of the ewes are late. Eight lambs, born in October and November, were weaned on February 1 and fed for the market. In forty-seven days they gained 170 pounds, and sold at Easter for \$11 each. The sheep-grading experiment with the Dorset rams and dark-faced, hornless, grade ewes is showing good

9 GEORGE V, A. 1919

results. A great many of the second cross animals are of fine Dorset type. Not only is the Dorset showing in the horns and white faces, but in wool and conformation as well.

Swine.—The swine kept on the Agassiz Farm are of the Yorkshire breed, and number forty-nine head. Nine mature sows were maintained throughout the year, at an average cost of \$43.61, including the cost of raising their young pigs to weaning age. These sows farrowed seventeen litters and raised 7.82 pigs per litter, or an average of 14.8 pigs per sow during the year. The breeding stock is housed in portable cabins on unproductive land. At farrowing time the sows are placed in the piggery, where special attention is given to the young litters for a couple of weeks. There have been sold during the year for breeding purposes 21 males and 23 females. With the aid of a self-feeder and pasture the feed cost to produce pork was \$8.12 per hundred and by the trough-feeding method \$8.30. In one trial \$13.70 per ton was realized for unmarketable potatoes when boiled and fed to fattening hogs.

POULTRY.

The stock kept consists of Barred Plymouth Rocks, Single Comb White Leghorns and Homer pigeons. The latter are unprofitable, as the demand for this class of poultry is very limited. Approximately 500 birds, exclusive of pigeons, were carried over the winter. From October 1, 1917, to April 1, 1918, the feed cost per bird was \$1.20, and the profit above the feed cost was \$1.11.

From a total of 4,700 eggs set, 1,986 chicks were hatched, or 42.3 per cent. The percentage of chicks raised from those hatched was 63.8 at a cost, at three and a half months of age, amounting to 60 cents per bird.

Soy bean meal was compared with beef scrap on early-laying Barred Rock pullets. The proportion of soy bean fed in the mash was one-third greater than of the beef scrap. The results obtained greatly favour beef scrap. This lot produced eggs at a cost of 24 cents per dozen, while the cost of eggs from the soy bean lot was 47 cents.

Experiments comparing closely confined birds with those allowed to run indicate that confinement is an advantage with pullets of the White Leghorn variety, but not with old hens. In the fertility of eggs, the confined birds in both cases were 2 per cent higher.

BEEES.

A very poor honey crop was obtained, the weather being very unfavourable during the principal honey flow. The manipulation to prevent swarming was not satisfactory in this district, as the bees killed their queens, which meant much wasted time in building up colonies. An increase of four colonies was obtained. The greatest production from a single hive was 35 pounds.

FIELD HUSBANDRY.

Rotations.—The four-year rotation consisting of: First year, hoed crop, corn or roots; second year, grain seeded down; third year, hay; and fourth year, pasture; has been continued with good results.

SESSIONAL PAPER No. 16

Crop Yields.—The following table shows the amount of each crop grown in 1917:—

Crop.	Yield.	
	Tons.	Lb.
Corn silage.....	313	127
Clover silage.....	173	1,200
Pea and oat silage.....	109	1,780
Clover hay.....	46	880
Mangels.....	85	1,100
Turnips.....	8	1,220
Carrots.....	6	1,600
Sugar beets.....	1	1,460
Potatoes.....	12	200
Mixed grains.....	23	
Oats.....	8	1,550
Peas.....	1	1,200
Barley.....		1,400

Cultural Experiments.—One hundred and forty plots are used for cultural investigational work, the chief objects in view being to determine: (1) The best method of preparing land for hoed crops, (2) the best seasons for applying barnyard manure; (3) methods of applying chemical fertilizers to mangels; (4) the best after-harvest cultivation of root land in preparation for a grain crop to be seeded with clover.

FERTILIZER EXPERIMENTS.

The fertilizer experiments A and B, started in 1915, were completed with the harvesting of the 1917 crop. A new experiment designated "E 7" is planned for the section formerly occupied by the old experiments. The primary object of the new experiment is to determine the most profitable combination and quantity of a fertilizer mixture as measured by its influence, in relation to cost, throughout a three-year crop rotation consisting of, first year, mangels; second year, grain; third year, hay.

CEREALS.

With the exception of the wheat varieties, the cereal work was conducted as usual. Of the eighteen varieties of oats tested, Gold Rain was first with a yield of 104 bushels 14 pounds per acre, while Banner was second with a yield of 100 bushels 20 pounds. Eighty-day, which matured in ninety-three days, gave the best yield of the early varieties. Of the twelve barleys tested, Gold repeated its performance of the previous year by heading the list with a yield of 58 bushels 21 pounds per acre. Odessa proved to be the best six-row barley. Solo and Arthur were the best yielding varieties of peas.

FORAGE CROPS.

Indian Corn.—The season of 1917 was suitable for the production of excellent corn crops. The long growing period gave an unusual advantage to the large, late kinds. Nine varieties were tested by the double plot system in one-hundredth-acre plots. Six of the most popular varieties were also tested in half-acre plots. In each Golden Glow proved the highest yielder.

Roots.—Twenty-six varieties of swede turnips, six of fall turnips, eighteen of mangels, eleven of carrots, and three of sugar beets were grown in duplicate test plots. All yields were below the average. Tankard Cream was again the best yielding mangel. Mammoth White Intermediate carrot and Russian grown beet seed proved superior to the other varieties. Ottawa-grown turnip seed of the Good Luck variety was superior

9 GEORGE V, A. 1919

to the commercial and to Cap Rouge-grown seed. Commercial seed of the Giant Yellow Intermediate mangel produced larger yields than the Ottawa-grown seed, while the small seed gave greater returns than the large seed. Some work in root seed production was done.

Soiling Crops.—Six varieties of soiling crops were grown. Rape kale proved to be the heaviest producer yielding 26 tons 850 pounds of green forage per acre.

Grasses and Clovers.—A seeding of 10 pounds of Red clover and 2 pounds of alsike per acre gave a much greater yield than any of the other mixtures tested. The light seeding of alfalfa gave the poorest yield, while a seeding of 20 pounds per acre proved the best.

HORTICULTURE.

The two ice storms which struck the Fraser valley during the month of December did much damage to the trees and shrubs, and their effects will be felt for some years to come.

The young orchard suffered severely, particularly the cherries and plums. Most of the walnut trees are ruined, the Japanese varieties standing the test best of all. Elms, oaks, and willows of all kinds and many of the flowering shrubs are damaged.

Fruits.—The orchard and small fruits did well last summer and some of the trees bore a small crop of apples and plums. Strawberries, however, were not good.

Vegetables.—The vegetable tests, both varietal and cultural, were continued with good results and experiments in planting and cultivating potatoes were also carried out.

Flowers.—Roses were a great success this season as also were the perennials, sweet peas and annuals, though owing to a late spring, they did not flower as early as usual. Not much seed of annuals could be saved this year as the autumn was so wet.

FARM IMPROVEMENTS.

Buildings.—The chief improvement work done on the buildings during the year consisted of painting the sheep barn, bull stable, silo, and dairy. A portion of the dairy was also replastered with a waterproof plaster. A pit scale was installed in the feed room of the cow barn.

Sidewalk.—A 4-foot cement sidewalk was constructed from the dairy barn, past the bull pens, to the piggery. This improvement adds greatly to the ease of transferring feed to these buildings, and is much appreciated by visitors during wet weather.

Fencing.—The old fence forming the paddock at the rear of the dairy barn was removed and replaced by one of good woven wire and square cedar posts. A number of the old hog fences at the north of the Farm were also removed, which allowed the extension of one of the rotation fields.

Land Clearing.—Three acres of land on the east portion of the Farm next to the Canadian Pacific railway were cleared and stumped. Six and one-half acres just north of it were underbrushed and will be used for sheep pasture. The 5 acres cleared in 1916 produced a good crop of peas and oats and also afforded some excellent pasture for the stock in the late fall.

EXHIBITIONS.

A travelling educational exhibit from the Agassiz Experimental Farm was staged at the following fairs: Vancouver, North Vancouver, Central Park, Coquitlam, Langley and Surrey. A cheese exhibit was also shown at Vancouver Exhibition and Victoria Home Products Fair. A small display of poultry models was sent to the

SESSIONAL PAPER No. 16

Mission Poultry Show and a pleasing collection of flowers was shown at the Agassiz Flower Show. A large number of persons were interested in the work of the Farm through this agency.

MEETINGS.

Besides the fairs mentioned above, the writer attended the following meetings: Annual meeting of British Columbia Holstein-Friesian Association, Essondale; Dairy-men's Convention, Kelowna; Poultry Show, Vancouver; Dairymen's Convention, Chilliwack; Live Stock Breeders Convention, Victoria.

VISITORS.

It is estimated that 1,880 persons visited the Farm during the year.

EXPERIMENTAL STATION FOR VANCOUVER ISLAND.

REPORT OF THE SUPERINTENDENT, LIONEL STEVENSON, M.S.

SEASONAL NOTES.

The climatic conditions of the year did not favour agricultural practice to the degree that is usually experienced in this district. A cool, late spring followed by an exceedingly dry summer period reduced to below average the yields of spring-sown crops on the upland soils. The autumn-sown crops were not as seriously affected by the drought. The winter was very favourable to crops on the drained lands and considerable growth was made each month. The results secured from the autumn seedings have been such as to indicate the advisability of the practice when possible in preference to the seeding in spring.

METEOROLOGICAL RECORDS.

Month.	Temperature F.			Precipitation.				Sunshine.
	Highest	Mean.	Lowest.	Rain-fall.	Snow-fall.	Total.	Heaviest in 24 hours.	
1917.				Inches.	Inches.	Inches.	Inches.	Hours.Min.
April.....	64.00	45.48	33.0	4.09	.....	4.09	0.78	90
May.....	72.50	51.10	36.0	0.70	.....	0.70	0.35	278 12
June.....	77.00	56.34	41.0	1.06	.....	1.06	0.35	217 36
July.....	85.00	62.52	43.5	0.18	.....	1.18	0.11	369 42
August.....	80.00	73.72	49.0	0.44	.....	0.44	0.22	339 36
September.....	76.50	56.00	42.0	1.35	.....	1.35	0.44	145 06
October.....	73.00	49.50	35.0	0.61	.....	0.61	0.43	154 36
November.....	59.00	46.03	33.0	1.85	.....	1.85	0.55	57 42
December.....	57.00	39.79	26.5	8.89	3.25	9.21	0.94	31 24
January.....	53.00	40.26	21.0	3.58	1.75	3.75	0.97	60 18
February.....	51.00	37.22	24.0	4.43	3.50	4.78	1.34	82 42
March.....	57.00	40.62	23.0	3.81	8.70	4.68	0.67	118 54
Totals.....				30.99	17.20	32.71		1,945 48

LIVE STOCK.

Horses.—Five work geldings are kept. These horses weigh 1,400 to 1,700 pounds each, and are used exclusively for land tillage and improvement work. The following ration was fed from April 1 to October 31: 1 pound of crushed oats, 4 ounces of wheat bran, and 1 pound of mixed hay per 100 pounds of weight of the horse. From Novem-

ber 1 to March 31 the grain ration remained the same, but oat straw was substituted for hay. Three pounds of carrots per horse were fed in addition to the grain and oat straw during the winter period. All horses thrived well during the entire year.

Cattle.—The Jersey herd established in December, 1916, has given an increase of four bull calves and one heifer calf during the year. These young cattle have all grown well. All animals have been fed liberally, and kept under ideal conditions. The butter-fat yields of the females in milk have not been as satisfactory as desired. All animals were tuberculin tested in December and no reactions were found.

POULTRY.

The costs of production work instituted in this department at its inception has been continued during the year. Feeding experiments for egg production, maintenance, and flesh production were carried out. Electric and oil-burning incubators of different types were tested. Costs and methods of brooding by hens and oil-burning brooder stoves were compared. A very satisfactory substitute for beef scrap was found in fish meal, a product always easily available on the coast. All birds have been trap-nested, and records of production kept. The best individual pullet-year record was 268 eggs, while ten pullets averaged 247.5 eggs each. Pedigree breeding has been started, and a system of recording worked out.

APIARY.

The five colonies were wintered outdoors in case-covered hives. The loss from any colony has not been as great as it was when the colonies were wintered without any protection. The surplus honey extracted from the apiary averaged 10 pounds per colony, which little more than paid for the sugar purchased for early spring and autumn feeding.

FIELD HUSBANDRY.

Rotations.—Four rotations are being operated at this Station, namely:—

Two-Year. First year, autumn-sown oats, peas, vetch and rye; second year, spring-sown rye, vetch and Egyptian clover, both crops grazed as temporary pasture.

Three-Year. First year, oats; second year, clover; third year, beans.

Four-Year. First year, corn; second year, wheat; third and fourth years, clover.

Four-Year. First year, oats, peas, and vetch for silage; second year, grain; third and fourth years, clover.

Crop Yields.—The total area in grain including test plots was 23 acres. Autumn wheat yields varied with varieties and locations from a minimum of 40 bushels to a maximum of 55 bushels in plot tests. The field average for 7 acres was 42 bushels.

Spring wheat yields in test plots varied from 19 bushels per acre to 27½ bushels per acre. Oat yields varied in test plots from 47 bushels to 68 bushels per acre, with a field average of 46 bushels per acre.

Peas.—The yields of this crop varied in test plots from 22½ bushels to 39 bushels per acre, with a field average of 38 bushels per acre.

Corn for ensilage was severely checked by summer drouth and gave a yield of 7 tons 800 pounds per acre.

CEREALS.

The following classes of grains were tested in the regular test-plot work:—

Winter wheats.. . . .	..nine varieties.
Spring wheats.. . . .	..eight varieties.
Winter barley.. . . .	..two varieties.
Spring barley.. . . .	..six varieties.
Winter peas.. . . .	..three varieties.
Spring peas.. . . .	..nine varieties.
Winter oats.. . . .	..two varieties.
Spring oats.. . . .	..ten varieties.
Winter rye.. . . .	..four varieties.
Spring vetch and tares.. . . .	..three varieties.

SESSIONAL PAPER No. 16

The cereal breeding started in 1916 was continued with good results. The cereal breeding plot now contains fifty hybrids and selections that have been made at this Station. The results from the cereal work at this Station indicate that more attention should be given to autumn-sown cereals in preference to spring crops.

FORAGE PLANTS.

Indian Corn.—Thirty varieties of corn were tested for fodder production giving a range of yields varying from 3 tons 1,960 pounds to 12 tons 1,855 pounds.

Twelve varieties of corn were tested for grain production and gave a range of yields varying from 75 pounds to 1,390 pounds per acre. King Philip proved to be the best prospect.

Roots.—Four varieties of mangels were tested and gave yields up to 16 tons 990 pounds per acre. Eight varieties of carrots were tested and gave yields up to 21 tons 500 pounds per acre. A large range of forage crops and forage crop combinations were tested, totalling in all 35 plots. Three varieties of sugar beets were also tested. A beginning has been made in root seed production. An area of alfalfa was established to test different distances of seeding when the row system is employed.

The plant breeding in this department has been confined to corn. Two of the hybrids secured in 1915 are promising; they are selections from the progeny of the North West Dent and Stowells Evergreen cross in one instance and the Adams and Wisconsin No. 7 cross in the other.

HORTICULTURE.

The orchards have grown very satisfactorily during the year, and small quantities of fruits and nuts were obtained. The system of clean cultivation has been practised to date in order that the newly cleared land could be brought into condition. The growing of legume crops for mulching will be practised in the spaces between trees in future.

The arboretum on the south and west sides of the horticultural area was successfully seeded to clover during the early part of the year. The trees in the experimental nut orchard have made fair growth, more especially the walnuts and almonds.

The production of the various small fruits was very satisfactory, and one record yield was obtained. The vegetable variety test work was somewhat reduced from the scheme of previous year and more time was devoted to experimentation in vegetable seed production. Fertilizer tests in vegetable production were carried out on a limited scale.

Ornamental Gardening.—The work with flowering bulbs has increased during the year, and there are now 25,000 bulbs set in the test plots in addition to those in the landscape. The work with annuals and perennials was somewhat reduced in order that concentration could be made on the more important lines. Considerable planting of trees and shrubs was done in the landscape area. Soil-improvement work was carried on during the dry period by way of treating the clay area used for vegetable and bulb work with a 3-inch application of sand. This treatment has improved the tilling quality of the soil in question.

BUILDINGS.

An implement shed, 48 feet by 24 feet, and a pump house, 16 feet by 16 feet, were erected during the winter period. These buildings are of plank frame, plain in type, serviceable, and of low cost, such as could be duplicated on any farm.

FARM IMPROVEMENTS.

The removal of stones, tile drainage, road improvements, and fence improvement work have received considerable attention throughout the year.

EXHIBITIONS.

The following exhibitions were attended and the Station educational exhibit set up: South Saanich Flower Show, the Nanaimo Agricultural Society Fair, the Comox Agricultural Society Fair, the Cowichan Agricultural Society Fair, the North and South Saanich Agricultural Society Fair, the Islands Seed Fair, the Lower Mainland Seed Fair at New Westminster, the Upper Country Seed Fair at Armstrong, and the Home Products Exhibition in Victoria.

A permanent exhibit has been maintained in Victoria.

MEETINGS ATTENDED.

The Superintendent attended and acted as judge of exhibits at the following fairs and exhibitions: the South, West, and North Saanich Flower Shows, the Nanaimo Agricultural Society Fair, the Comox Agricultural Society Fair, the Ladysmith Agricultural Fair, the Islands Seed Fair at Duncan, the Seed Fair at New Westminster; and the Seed Fair at Armstrong.

The Superintendent attended, by request, and delivered addresses at the following organizations' meetings: Seed Growers meeting held at Duncan, South Saanich Farmers Institute, the Sidney Board of Trade greater production meetings, the city of Victoria greater production meetings, the Ward 4 greater production meetings, the British Columbia Dairymen's Summer convention at Kelowna, the British Dairymen's Winter convention at Chilliwack, the Islands Seed Fair at Duncan, the Seed Fair at New Westminster, the Seed Fair at Armstrong, the organization of the British Columbia Seed Growers Association, the Short Course in Agronomy at the University of British Columbia. The executive meetings of the Food Products committee of Victoria Board of Trade, the British Columbia Dairymen's Association, the British Columbia Seed Growers Association have received due attention.

Greater Production.—All organizations in the district working for greater production of Foods have been assisted in an advisory way in council, in a publicity way on the platform and in a practical way by the distribution of good seed, to the limit of our ability to do so.

VISITORS.

Over three thousand people visited the Station during the year; a number of these were picnic parties of business people from Victoria, Farmers' and Women's Institute picnics, Red Cross organizations, tourists, and numerous individual visitors from the district.

